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ABSTRACT

This study investigated the appropriateness both to the delivery system and to students of Athabasca University of the audiotutorial method of instruction in an introductory level Biology course, which used selections of audiotutorial materials from "Minicourses in Biology." Evaluation data were gathered by using pre-post test (content) results, time sheets, post cluster questionnaires (cognitive, affective, and instructional concerns), activity sheets, personal interviews, and credit examinations. Student enthusiasm was high, and a significant pre-post test improvement was evidenced in student achievement across clusters. Problem areas identified in the course included sequencing of clusters; clear differentiation to students of pre-, post-, and in-house laboratory activities; length of course; availability of packaged materials; and technical demands of delivery of live organisms in winter. This course, with appropriate modifications, was found suitable for offering to larger numbers of Albertans. (Author/JEG)

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An Assessment of An Audiotutorial Approach to Learning

by

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CONTENTS

SUMMARY 1

I. INTRODUCTION 1

A. Science Courses at remote Learning Centres. . 2
B. The audiotutorial course 3
C. The research project 4
D. Acknowledgements 5

II. THE EVALUATION DESIGN 8

A. Introduction 8
B. Materials used in evaluation 8
C. The evaluation design 11

III. CONTENT EVALUATION 13

A. Introduction 13
B. Quality and quantity of content in MIB . . . 14
C. Canadian content 14
D. Duplication of content in minicourses 14
E. Sequencing of clusters 15
F. Appropriateness of MIB to Athabasca University 17
G. Comments on individual clusters 18

Cluster A. Human Sexuality 18
Cluster B. The Working Cell 20
Cluster C. Genetics 21
Cluster D. Energy in Life 22
Cluster E. Diversity and Unity Through Time 23
Cluster F. Plant Structure and Function . 24
Cluster G. Animal Structure and Function 25
Cluster H. Biology in the Contemporary World 28

IV. EDUCATIONAL EVALUATION 29

A. Students 29

1. Pre-tests and post-tests 29
2. Written examinations 32

3. Student characteristics 34
4. Student course evaluation post-cluster questionnaire. 35
5. Development scan 36
6. Observation 36
7. Personal interviews 36
8. Time expended 37

Student Measures 37
Instructor Measures 40

B. Instructors 45

1. Activity breakdown 45
2. Instructor course evaluation post-cluster questionnaire 45
3. Administrative details 46
4. Record of student activity 46
5. Personal interviews 47

C. General 47

D. Additions/Modificiations 51

V. A SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS. . 52

A. Preparations for giving the course 52
B. Course content 55
C. Educational evaluation 56
D. Some disadvantages 57
E. Dissemination of the findings of this project 58

VI. BUDGET 60

VII. BIBLIOGRAPHY 62

VIII. APPENDICES 64

Appendix A 64
Appendix B 65
Appendix C 66
Appendix D 70
Appendix E 82
Appendix F 86
Appendix G 96
Appendix H 104
Appendix I 108

SUMMARY

AN ASSESSMENT OF AN AUDIOTUTORIAL APPROACH TO LEARNING

by

Trilochan S. Bakshi and Lily Oddie

A university-level Introductory Biology course was offered in 1976-77 by Athabasca University at Lloydminster and Fort McMurray in Alberta. It used selections of audiotutorial materials from "Minicourses in Biology". The basic purpose of the present study was to ascertain the appropriateness of the audiotutorial method of instruction to the delivery system and students of this University.

Content evaluation was done by the in-house staff of Athabasca University, and the external consultants from the University of Alberta.

Educational evaluation data were gathered by using the following instruments: pre-post tests (content); time sheets; post-cluster questionnaires (cognitive, affective, instructional concerns); activity sheets; personal interviews; and credit examinations.

The course progressed extremely well at both locations. In general, the enthusiasm of the students was high, and a significant pre-post test improvement was evidenced in student achievement across clusters. The University experienced considerable success in being able to use the existing high school and college facilities.

Several minor problem areas have been identified in the course. These include: sequencing of clusters; clear differentiation to students of pre-, post-, and in-house laboratory activities; length of course; availability of packaged materials; technical demands of delivery of live organisms in winter, etc. The course, with appropriate modifications, should prove suitable for offering to larger numbers of Albertans.

This is the first time that a comprehensive content and educational evaluation of a course has been systematically carried out at Athabasca University. It has yielded valuable information about planning, delivery, and evaluation of an audiotutorial course.

PART I

INTRODUCTION

I. INTRODUCTION

Athabasca University is an off-campus, open-learning, open-admissions, undergraduate institution catering to the needs of the adult learner who is unable or unwilling to take advantage of educational services offered by traditional universities for reasons of time, distance, family or work responsibilities, and/or program or course relevance. It offers traditional and nontraditional courses by using traditional and nontraditional teaching-learning methods. In 1976, it decided to give its Introductory Biology course by using the audiotutorial (A-T) techniques. The basic purpose of the present study was to ascertain the appropriateness of the A-T method of instruction to the Athabasca students and to the Athabasca delivery system with regard to this course.

The A-T approach to learning is compatible with the philosophy of Athabasca University. The A-T system evolved at Purdue University in the 1960s as an instructional strategy permitting students to control the pace of their instruction, to adapt to the nature of their own study patterns, and to adjust the time of study to their convenience. Other defining characteristics of the A-T approach include: direct active involvement of the learner; sequenced learning activities; careful identification of objectives, and critical selection of multimedia materials to help the student achieve them; provision for flexibility (student discussions, field experiences, long-range research projects, general assembly sessions, etc.). These characteristics are incorporated in what has now come to be known as a minicourse. Briefly, a

minicourse is a unit of content considered to be a reasonable coverage of a given topic. Various minicourses in a grouping or "cluster" are linked with a stated central theme. Since 1969, the minicourse concept has been an integral aspect of the A-T system.

The basic difference between other Athabasca University courses and the A-T course in biology is the introduction of a "Learning Centre" for small groups to engage in individually paced activity-oriented instruction. The Learning Centre contains essential laboratory equipment needed for the conduct of the course, and is large enough to hold the various multimedia materials which define its function (slide arrays, film strips, cubicles for audio-visual equipment, etc.).

A. Science Courses at remote Learning Centres

In accordance with its mandate, Athabasca University provides university transfer programs at several places including the Keyano College at Fort McMurray, and the Lakeland College at Lloydminster. In the sciences, this program involved the offering of the following courses in 1976-77:

1. Introductory Biology - Fort McMurray and Lloydminster
2. Chemical Principles - Fort McMurray and Lloydminster
3. Calculus - Fort McMurray

These courses were scheduled to be given in October 1976 by using the self-study materials. Unfortunately, the learner-convenient packages for these courses were not expected to be ready

by that date. Athabasca University therefore decided to give them "live", i.e. by the traditional lecture mode.

B. The audiotutorial course

In the spring and summer of 1976, Dr. T. S. Bakshi, Head of the Environmental Sciences at Athabasca University, examined several textbooks and related materials for adoption in the science courses, particularly in the Introductory Biology course. Since Athabasca University caters especially to those students who are unable or unwilling to go to a traditional campus, the examination of textbooks included a critical study of those materials which are self-paced and self-instructional. As is well known (see Baker, 1970; Fisher, 1976; Hahn, 1971; Johnson and Johnson, 1971; and many others) the A-T materials integrate various methods of presentation (films, slides, filmstrips, lab experiments, etc.), are self-contained, can be stored for repeated use every year, and are individualized. The search for a suitable "textbook" therefore led to the materials produced by Dr. S. N. Postlethwait.

In August 1976, Athabasca University sent Dr. Bakshi to Purdue University to examine the A-T mode of instruction in the laboratories of Dr. Postlethwait. He studied the various A-T techniques, observed the individualized instruction in introductory biology, discussed the various aspects of giving the course by the A-T methods with Dr. Postlethwait and his associates, and reviewed the "Minicourses in Biology" (see Postlethwait, 1976). On his

return, he gave a detailed report of his visit to Purdue University to the Academic Council of Athabasca University, and recommended that Athabasca University give the Introductory Biology course at Fort McMurray and Lloydminster by using the above A-T materials. The Academic Council approved the recommendation in early September 1976.

C. The research project

This was the first time that a full-fledged A-T course was being given by a university in Alberta. It was therefore felt desirable to evaluate the outcomes of the course. Dr. Bakshi made an initial request to the Learning Systems Branch of Alberta Advanced Education and Manpower for financial assistance for a research project to assess the A-T approach to learning. On receiving a very favourable response, he invited Dr. Lily Oddie, Coordinator of Institutional Research and Evaluation at Athabasca University, to join him in the project. The two then submitted to the Learning Systems a detailed proposal for the content and educational evaluations of the A-T approach to learning in Introductory Biology. The following Persons were involved in this research project:

Project Director:	Dr. T. S. Bakshi Head, Environmental Sciences Athabasca University
Educational Evaluator:	Dr. Lily Oddie Coordinator Institutional Research and Evaluation Athabasca University

Project Assistant:	Mr. Robert G. Holmberg Coordinator Introductory Biology Athabasca University
Consultants:	Dr. W. A. Fuller Professor of Zoology University of Alberta
	Dr. W. N. Stewart Professor of Botany University of Alberta
Instructors:	Mr. Bryan Lane and Mr. Andy Klar Lakeland College, Lloydminster
	Mr. Harvey Beck Keyano College, Fort McMurray

The formal approval for the research project from Alberta Advanced Education and Manpower was not received until early November 1976. In anticipation of such an approval, however, Drs. Bakshi and Oddie went ahead with the initial steps involved in the implementation of the plans for the project. By the time the approval was received, the project was fully operational.

D. Acknowledgements

Although Dr. Bakshi and Dr. Oddie are entirely responsible for the planning, progress, and reporting of the project, their work would not have been possible without the cooperation of many individuals. They would like to express their sincere thanks to all who assisted them in various ways. Although many persons were involved, the following need special mention:

1. Alberta Advanced Education and Manpower:

Dr. D. G. Crawford and Dr. M. G. Massey-Hicks discussed the initial project proposal and made a number of valuable suggestions. They, along with Miss Heather Pringle, assisted in various ways throughout the course of the project.

2. Learning Centres at Lloydminster and Fort McMurray:

Mr. Bryan Lane, Mr. Andy Klar, and Mr. Harvey Beck worked as instructors. They and the students cooperated in various ways, especially by answering questionnaires, and by keeping records of numerous activities related to the A-T mode of instruction.

3. External Consultants:

Dr. S. N. Postlethwait of Purdue University explained various practical aspects of preparing and giving an A-T course. Dr. W. A. Fuller and Dr. W. N. Stewart of the University of Alberta gave advice on course content and assisted in the evaluation of parts of "Minicourses in Biology".

4. The Publishers of "Minicourses in Biology":

Through the efforts of Mr. Walter S. Bailey, General Manager, W. B. Saunders Canada Limited, the publishing firm contributed $1,000.00 worth of print and audio materials at no cost to Athabasca University.

5. Athabasca University:

Dr. W. A. S. Smith, President, and Mr. Barry L. Snowden, Vice-President, University Services, encouraged the undertaking of the project, and the latter also gave advice on budgeting matters. In his capacity as Coordinator for the course, Mr. Robert G. Holmberg ordered, received, and distributed the laboratory materials, prepared print materials in cooperation with appropriate project staff, and in general assisted in various ways for the smooth operation of the project. Dr. A. Chandrasekharam helped in preparing examinations. Mr. J. M. Richmond gave advice on the preparation of the project proposal. Ms. Lynn Marler and Mrs. Kathleen MacLean helped in ordering and cataloguing materials. Mrs. Sharon McKeen and Mrs. Doreen Palichuk looked after the secretarial duties.

PART II

THE EVALUATION DESIGN

II. THE EVALUATION DESIGN

A. Introduction

The primary purpose of this project was to ascertain the appropriateness of the A-T methodology as used in the educational materials included in MIB to the adult student within an "open" learning system. A search of the literature revealed a paucity of evaluative studies relating directly to the focus of the present project. A partial list of the evaluative studies is included in the Bibliography. These and other studies tended to deal with outcome measures and/or isolated variables and not with the 'process' of learning from cognitive, affective and instructional perspective and from an integrated systems approach to evaluation involving the learner, the materials and the instructional environment. Nonetheless, the literature *in toto* did provide guidelines and direction for a detailed research design for yielding both product and process measures, and for providing a basis for ongoing evaluation and the compilation of a supportive data base.

B. Materials used in evaluation

The "textbooks" used in this course were selected from the "Minicourses in Biology" (hereafter referred to as MIB) produced by the Biological Sciences Curriculum Study and Purdue University under the directorship of Dr. S. N. Postlethwait (see Postlethwait, 1976). MIB consists of twelve "clusters", and each cluster contains

a varying number of minicourses as shown in Table II-A (page 10). Athabasca University's Introductory Biology course consisted of eight clusters (Clusters A through H as shown in Table II-A) containing 45 minicourses. All content evaluators agreed that this material would be more than sufficient to make the introductory biology course fully transferable to most other Canadian universities.

The students were also provided with a supplementary text entitled "Biology" (Curtis, 1975), and some reprints from Scientific American for "further reading". They were not tested in the material from these sources, and were specifically told that these readings were strictly for general information purposes.

Each cluster of MIB is provided with two booklets (a Study Guide for the student, and an Instructor's Manual), and a collection of one-hour cassette tapes, usually one tape for each minicourse. The laboratory materials for each cluster are available in packaged form from Boreal Laboratories Ltd., Mississauga, Ontario.

The Learning Centre at Lloydminster was located in the biology laboratories of the local high school. The laboratories were well-equipped for giving such a course, and our instructors had access to biological collections, chemicals, microscopes, and other equipment.

The Learning Centre at Fort McMurray was first located in the biology laboratories of the local high school, but was later moved to Keyano College labs. The high school labs were somewhat crowded,

TABLE II-A. Clusters and minicourses included in "Minicourses in Biology" (see Postlethwait , 1976)

CLUSTER	Minicourses in Cluster	Minicourses Selected For Athabasca's Course
A. Human Sexuality	5	5
B. The Working Cell	7	5
C. Genetics	6	6
D. Energy in Life	6	4
E. Diversity and Unity Through Time	7	5
F. Plant Structure and Function	8	7
G. Animal Structure and Function	9	8
H. Biology in the Contemporary World	5	5
I. Environmental Biology	6	0
J. Methods of Investigation	6	0
K. Animal Growth and Development	6	0
L. Investigating Behavior	5	0

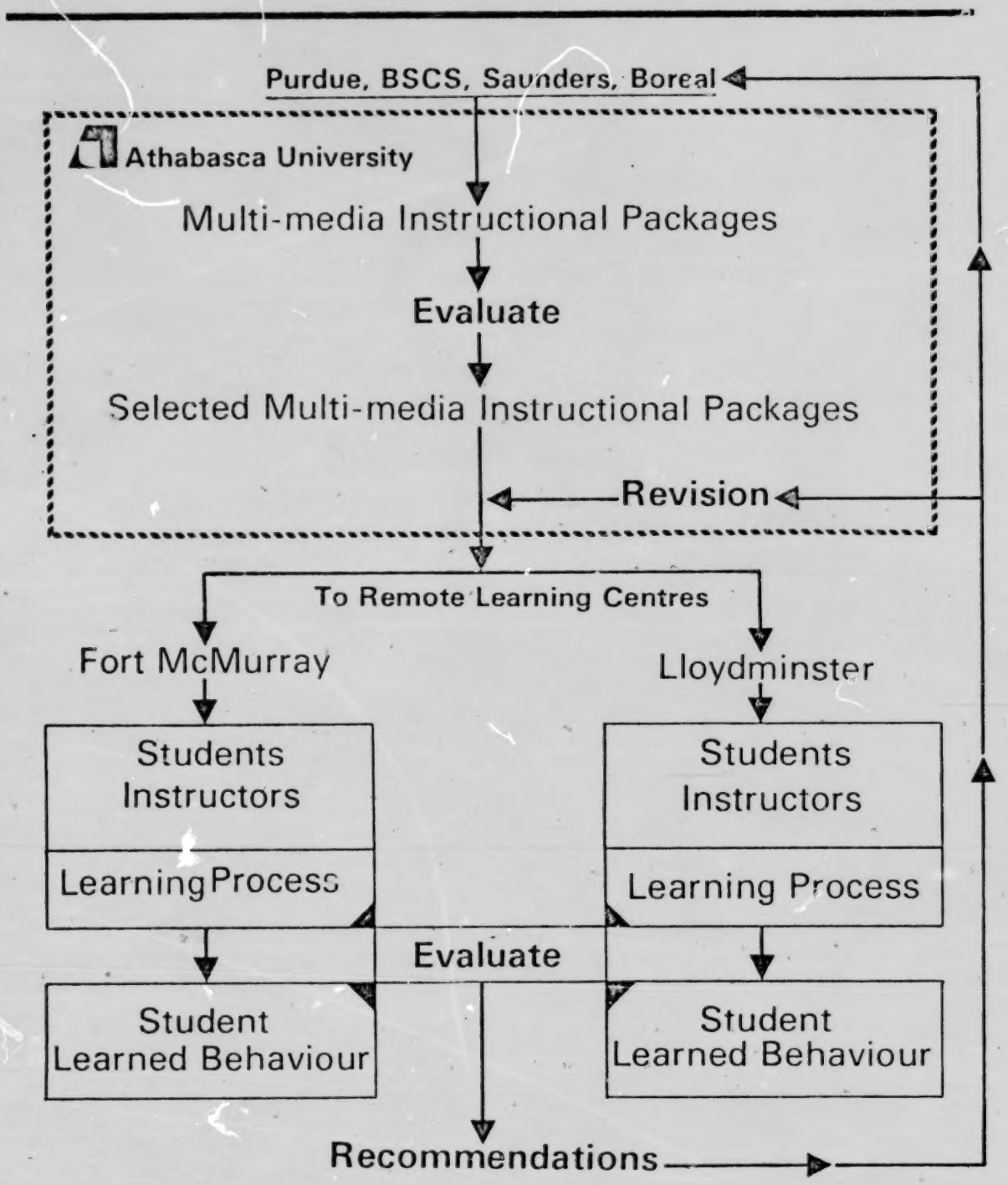
and there was little room for storage of our materials. The Keyano College labs proved more satisfactory, especially because the course instructor was a regular employee of the College, and gave his other courses in the same labs.

C. The evaluation design

The figure on the next page shows the materials, agents, and activities used to carry out the evaluation of the A-T process in two remote learning centres at Fort McMurray and Lloydminster. The content evaluation was carried out at Athabasca University, University of Alberta, and the two Learning Centres. It consisted of various individuals reviewing the clusters assigned to them, and reporting back to the Project Director.

The educational evaluation consisted of a comprehensive, in-depth analysis of the learning/instructional process. Such an analysis involved the product and process measures taken on learning materials, students, and instructors. Specific details of the measures are given in Table IV-A (see pages 30-31 of this report). This report also includes pragmatic, procedural, and planning considerations. Alternative action plans and parallel decisions are presented. Of importance is the relationship of the findings to Athabasca's mandate as an innovative, nontraditional university.

FIG. II-1. THE EVALUATION DESIGN



PART III

CONTENT EVALUATION

III. CONTENT EVALUATION

A. Introduction

The content evaluation was carried out by the biologists at Athabasca University and the consultants from the University of Alberta. The instructors at the two Learning Centres were also consulted about the course content.

The MTB clusters deal with very diverse topics. For this reason, one external consultant reviewed Clusters B, C, E, and F, and the other examined Clusters A, D, G, and H. The Athabasca University biologists reviewed all eight clusters independently as well as jointly with the external consultants and the instructors.

Some of the questions asked in making this evaluation were:

1. The quality of material: Is it up to date, and does it deal with topics at a desired "level"?
2. The quantity of the material: Is it sufficient to make up what is usually given in an introductory biology course in most Canadian universities?
3. What about Canadian content? Should it be augmented?
4. What about the amount of duplication in minicourses of different clusters?
5. Sequencing of the clusters: Should it differ from the outline adopted for the year 1976-77?
6. Are the course and its contents appropriate for Athabasca University?

The answers to these and other questions are included in the following discussion.

B. Quality and Quantity of Content in MIB

We are quite satisfied with this aspect of the clusters, and we are of the opinion that the course is fully comparable to any other introductory course in biology in most Canadian and American universities. Therefore, there should be no difficulty in its transferability to other universities.

C. Canadian Content

Nationalistic input has no place in the clusters used in this course. There are no Canadian cells, nor is there a Canadian genetics. If organisms that occur more commonly in Canada were to be inserted in "Diversity and Unity" or "Plant Structure and Function" it would be a contrived situation, although it certainly would be useful for the students to know better the world around them. The principles and concepts of biology are the same in the U.S.A., Canada, France, or Timbuktu. One can always use the examples of Canadian biologists who have made contributions to the basic concepts of biology. Unfortunately, there are few, if any, names that could be used in the areas covered by the clusters included in this course.

In the area of Ecology, the Canadian environment is unique in several ways and it is legitimate to stress this.

D. Duplication of Content in Minicourses

The authors of MIB believe that many minicourses can stand on their own. This is true in a number of cases, especially the

introductory minicourses. Most biological topics, however, are difficult to teach without the student having some knowledge of certain related topics. The so-called independence of clusters forces the authors to introduce some duplication. For example, meiosis should be fully known to the student when he is studying reproduction in plants (Cluster F), animals (Cluster G), and humans (Cluster A). Since meiosis is dealt with in detail in genetics (Cluster C) which, due to the need for sequencing, was taught after Cluster A, students couldn't be expected to understand human reproduction as well as they should.

We do not know of any course where these and similar problems can be avoided. An organism lives because so many things are happening simultaneously in and between its cells, and between the organism and its environment. It is very difficult for a beginning student to comprehend these myriad of activities and relate them to each other. This is why an introductory biology course is one of the most difficult ones to teach.

E. Sequencing of Clusters

With regard to the proper sequencing of concepts and topics in biology textbooks, it has to be emphasized that there is no "best" order in which topics should appear, no mandatory set of topics that must be presented, and no single "best" way to present the material. Some factual material must be learned by the student, but to make biology a course in memorization of facts and names of organisms, or their parts is a wrong approach and "turns the student off". If, on

the other hand, the student can be directed to the understanding of a concept at the same time using the necessary factual material, he will find the study of biology a much more rewarding experience. The audio-tutorial system in MIB, put together by Dr. Postlethwait, succeeds in the latter.

Having stated above that there is no "best" way for sequencing of the topics (concepts) in biology, one can suggest certain other "natural" groupings. One of these is given below:

Cluster B. The Working Cell

Cluster D. Energy in Life

Cluster F. Plant Structure and Function

Cluster G. Animal Structure and Function

Cluster E. Diversity and Unity Through Time

Cluster C. Genetics

Cluster A. Human Sexuality

Cluster H. Biology in the Contemporary World

One must admit to some qualms starting the students with so many abstract ideas, as well as a dose of chemistry in Clusters B and D. There will be some students who will find this difficult. The arrangement shown above is dictated by the levels of biological organization which is a concept that students must understand. In moving the cluster on "Human Sexuality" to a later time, we reduce the anthropomorphic impact of the course. It seems logical that "The Working Cell" and "Energy in Life" should be placed together since energy transformations take place at the molecular level in the

cell and are associated with structures of the cell. The cluster on "Genetics" should either precede or follow "Diversity and Unity Through Time". In other words, there should be some understanding of the causes or mechanisms of evolution and the products of evolution.

Other possible sequencing could involve dealing first with diversity of organisms, then with plants and animals, and finally with cell, energy and genetics. This is a "classical" approach which is followed in many universities. When students have very little previous knowledge of biology, this sequencing is especially useful because here the course begins with the somewhat familiar topics, expands on them, and then deals with the less familiar areas.

F. Appropriateness of MIB to Athabasca University

Of the various classes or types of post-secondary institutions offering introductory biology, Athabasca University provides an environment well suited for the audio-tutorial type of instruction. In an "open" type institution, where the clientele is not part of a single community but depends on meeting in many smaller centres throughout the Province, the audio-tutorial system has certain obvious advantages. This is especially true if uniformity of instruction is a desired goal.

Offering a lab course like Introductory Biology in different parts of the Province requires considerable amount of preparation on the part of the course coordinator. The purchasing of lab materials from various companies and making them available at the learning centres

in proper quantities and at the desired times taxes the resources of the coordinator. Because the learning centres are located in the biology labs of high schools, the labs cannot be left open for students to work at any time. The course, therefore, is audio-tutorial and individualized, and it must be taken at specified times.

G. Comments on Individual Clusters

Cluster A - Human Sexuality

1) Human Reproductive System

The introductory statement should give some mention of the role of sexual reproduction in generating the diversity on which evolution works. This is not stressed in the Animal Structure and Function cluster either. It is stressed in the Genetics cluster but it should be cross-referenced in the other two.

There is no mention of the endocrine function of gonads in this minicourse and it should be cross-referenced. The duality of these organs is critical in considerations of regulating reproduction, which is discussed in Cluster H (Biology in the Contemporary World).

2) Sexual Maturation

Here the dual nature of the gonads does creep in, but the histological detail is sketchy. Discussion of menstrual cycle is good, but here, as in Cluster G, the authors speak only of

feedback, without distinguishing between positive and negative feedback. All the processes described are examples of negative feedback, but the existence of both types should be recognized.

3) Pregnancy

The diagram and discussion of meiosis are superficial, and this, of course, is unavoidable since meiosis receives detailed treatment in the Genetics cluster. For this reason, there should be at least a cross-reference to a detailed discussion of such a fundamental process. There is no mention here of the generation of diversity. The student may wonder why two divisions are required just to halve the number of chromosomes. Again, much of the discussion is at an individual level rather than the level of principle. The derivation of organs from primordial germ layers, a rather general phenomenon, for example, gets short shrift, while advice to pregnant women and description of normal birth, take up several pages.

4) Birth Control

There is no distinction between conception control and birth control. All the methods discussed are for control of conception, but they are labelled birth control. Birth control includes abortion as well as methods of controlling conception.

The discussion of sterilization should differentiate between vasectomy and castration. It is here that the dual nature of the gonads becomes important. This is why it is necessary to give this point more emphasis.

5) Venereal Disease

This is again a case of emphasizing the personal or individual interest instead of general principles.

Cluster B. The Working Cell

In the 1976-77 offering, the minicourse entitled "The Cell Membrane" was deleted. Since membranes are very important in cell function, it is suggested that this minicourse should either be included in the course or be reviewed by instructors at the learning centre.

1) Cells: Units of Life

Up-to-date, interesting in presentation, well illustrated and easy to understand.

2) Cellular Chemistry

Many students will find this difficult because of a lack of motivation as far as chemistry is concerned. A warning should be given the students that there is no intention that they try to memorize the molecular configurations that are presented in this minicourse.

3) The Cell Membrane

Same comments apply as for #2 above.

4) The Nature of Enzymes

Same comments apply here as for #2 above. Please don't ask the students to memorize the Kreb's cycle. They may also find the abstract presentation of how enzymes may act in a substrate difficult. There are many names of compounds listed in this part and again the student may fall into the trap of thinking he must memorize all of these.

5) The Genetic Material

Very well presented.

6) Protein Synthesis

Again, the abstract ideas may prove difficult for some students. The material is up-to-date. Illustrations are very helpful.

7) The Immune Response

We suggest omission of this minicourse.

Cluster C. Genetics

The reviewers' comments are all positive with respect to the minicourses in this cluster. Coverage is good. Material is up-to-date. The presentation is interesting, the illustrations are good, and the order is logical.

Cluster D. Energy in Life

1) Nature of Energy

This minicourse and the examples are excellent.

2) Generating and Receiving Energy

Again, this is a good minicourse.

3) Stabilizing Energy: Photosynthesis

The exercises and descriptions are clear and lead to reasonable answers. One reviewer had never studied photosynthesis at the molecular level before, and he found that it was rather fun to try to figure out what happens next.

4) Respiration

This minicourse, too, seems to be well done. It is a complex process to learn on your own, but the approach used is quite useful.

5) Utilizing Energy

Again, the approach seems to lead the student through a complex series of reactions in easy stages. There is a typographical error in Figure 5 on page 5 of this minicourse. Reaction d. should read:

$$ATP + H_2O \rightarrow ADP + HPO_4$$

as it does in the text on page 4.

The explanation of muscle contraction is about as clear as is seen anywhere, but the explanation of active transport is a little superficial.

6) Human Energy Perception

We would question one point in the answer to Table 1, namely, the claim that we are unable to detect IR. Surely we detect it as heat.

With respect to vision, there are some interesting differences between rod cells and cone cells that are not mentioned. The correlation between color vision and visual displays as in birds on the one hand, and lack of color vision with dull colors, as in most mammals, on the other hand, is not mentioned. Neither is the difference in resolving power between the two mentioned. We have cones because we came from one of the few mammalian orders that are diurnal and use bright colors in sexual displays, etc. Cones give us the resolution to see fine print, thread needles, etc., and therefore were probably critical for our cultural development.

Cluster E. Diversity and Unity Through Time

This is a good cluster. Some general comments about different minicourses may, however, be appropriate here. The minicourse on Classification of Organisms deals in great detail with the advantages and disadvantages of 2, 3, 4, and 5 kingdom systems of classification,

and the student is given the impression that the 5 kingdom system is the best. Yet in later minicourses and in other clusters, the 2 kingdom system is followed.

There are some rather obvious errors in this cluster. On page 13 of the minicourse "Origin of Life", Figure 14 has the bacteria above and the microspheres below, not the reverse. In "Plant Diversity", "spore" seems to have been used synonymously with "seed" (page 5). Also, some of the phylum and division names have not been used consistently. For example, in "Neither Plant Nor Animal", the flagellates are in the Phylum Zoomastigina on page 10 but in Mastigophora on page 16. For a beginning student, these errors can cause numerous headaches.

Cluster F. Plant Structure and Function

The material in this cluster is up-to-date, well illustrated, and well presented. There is excessive duplication between the structure and function of stomata in the minicourses on "Leaves" and "Water Relations". If both minicourses are used, some adjustment by the instructor for this is recommended. If the Genetics cluster were to be given after this cluster, more emphasis will have to be given to the differences between mitosis and meiosis. This information is emphasized in the cluster on Genetics. Some instructors may, for this reason, have the cluster on Genetics precede the ones on plant and animal structure and function.

There are some printing errors in this, as in other clusters. For example, in the minicourse on "Leaves", Figure 25 is printed upside down.

Cluster G. Animal Structure and Function

1) Complementarity

This is a good minicourse.

2) Digestion

Seems a good comparative approach. Figure 10, page 8, labels "bile" duct as "gall" duct. This may confuse students since text says bile duct.

3) Gas Exchange

It is probably incorrect to speak of diffusion gradients. Perhaps partial pressures would be more accurate. From time to time the word "tension" is used, which suggests that the authors are aware of this.

Figure 12 shows a counter-current exchange system. Such systems are found in a number of places, so the system is of general importance and probably deserves more emphasis.

On page 12, they have trouble with their Latin. Bronchus becomes Bronchia in the plural (Figure 13) and when this returns to the singular in the caption for Figure 14, it has been transformed into Bronchium.

4) Circulation

In the introductory paragraph, "systematic" should read "systemic".

There is a strongly human medical orientation to this discussion.

5) Excretion

The explanation of the counter-current multiplier system in the kidney is not very clear. Admittedly, this is a difficult concept to grasp, but the explanation given here doesn't quite fit.

There is discussion of how excretory systems and products are related to surroundings--salt or fresh water or air. However, there is no explanation of how salt-water fishes conserve water--by doing away with Bowman's capsule. The minicourse suggests some sort of filtration in the glomerulus, although only proteins are retained in the blood, while the concentration of solutes doesn't change. Evolutionarily speaking, the glomerulus seems to have been primarily a water pump.

6) Biomechanics

The first section, on levers, is only high school physics.

The discussion of adaptations for speed in terrestrial mammals is very superficial. Likewise, a diagram showing vectors of forces generated by fish and porpoises would have been useful.

The part on man is good. Some comparison with the only other bipeds - birds - might have been useful.

7) Hormonal Regulation

This should include an introductory paragraph comparing chemical messengers (hormones) with electrical messengers (nerves), and pointing out that neurotransmitters are hormone-like.

Again, it should be pointed out that control can only be exercised by negative feedback. Otherwise, the models are good.

8) Reproduction

Even here there is no detailed study of meiosis or any cross-reference to another cluster.

The dual nature of the gonads is not stressed either, nor is there any cross-reference to the population minicourse where human reproduction is stressed.

9) Nerve Transmission

The structure of the nervous system gets short shrift. Students generally have a difficult time with the subdivisions and relationships of this system. This course virtually ignores the problem.

Figure 4 on page 6 gives the impression that afferent and efferent stimuli travel by different nerves, whereas, in reality,

only the roots are double and the nerves contain both kinds of fibres.

The explanation of resting and action potentials is the clearest that is seen anywhere and is one of the real strengths of the cluster.

In the discussion of the synapse, it should be stressed that they act as one-way valves. Axons will transmit in either direction (Figure 26) but the synapse can only be crossed in one direction.

The tape (page 2A) implies that the muscle converted the electrical energy of the stimulus into the kinetic energy of contraction. This, of course, is not true since the kinetic energy comes from chemical energy in ATP.

Cluster H. Biology in the Contemporary World

We were somewhat disappointed in this cluster. The fundamental reason for the disappointment is that our bias is toward widespread and general problems, while the bias of this cluster is toward individual problems - cancer, disease, drugs. The strongest minicourse is the one on population. One can see why the "biological basis of race" is included for use in the U.S., but it is not a big problem in Canada. A minicourse on food and agriculture should be in here, and one on conservation of renewable (biological) resources - from soil micro-organisms to whales.

PART IV

EDUCATIONAL EVALUATION

IV. EDUCATIONAL EVALUATION

The details of the educational evaluation schema as submitted to Alberta Advanced Education and Manpower in Fall 1976 are given in Table IV-A (pages 30-31). Results of the evaluation reported here follow the framework used in this Table.

A. Students

1. Pre-tests and post-tests

A summary sheet of the results of pre-tests and post-tests by cluster for all of the students taking the course at the two learning centres is given in Appendix A. The frequencies have been converted to percentages, and the pre-post comparisons are the final mark averages across the component sections of each test (multiple-choice; matching/labelling; short answers). The pre-post tests were not for credit in the course.

The figures from Appendix A have been used to draw Fig. IV-1 (page 32) which shows significant pre-post differences across all clusters for which data were available. Arguments on the validity of difference scores notwithstanding, the results do show that some measure of learning was obtained for each cluster across students during the period of instruction. Also, the pre-test figures give a general indication of the entry level of students on a discrete unit of material. For example, Cluster A (Human Sexuality) shows a high entry level (65.5%). This is not unexpected inasmuch as the cluster was a synthesis and extension of advanced high school instruction, and did not contain a heavy

TABLE IV-A DETAILS OF THE EDUCATIONAL EVALUATION SCHEMA

(* = appropriate form designed and provided to user)

DESCRIPTION	ADMINISTRATION DETAILS			DATA YIELD
	When	Quantity	How/Who	
A. STUDENTS				
1. Pre-post tests* - based on content of - multiple-choice - Matching/labelling - short answers (non-credit)	each cluster	16	Instructor or Educational Evaluator	- achievement - learning process and product
2. Written Examinations* - based on content of course				
(i) Three-hour (credit)	November December February April	)4)))	Instructor	- learning-achievement product COURSE CREDIT
(ii) Final (alternative)	Course-end	1	Instructor	Learning-achievement COURSE CREDIT
3. Supplementary Registration Information Form* - background info (previous education, number of children, etc.) - non-credit	beginning of course	1	Educational Evaluator	- student characteristics
4. Student Course Evaluation Post-Cluster Questionnaire* - scales - multiple choice - open-ended (short) - non-credit	end of cluster	8	Instructor or Educational Evaluator	- values/reactions instructional cognitive affective
5. Development scan				
(1) study guides (workbook)	each cluster	8	Educational Evaluator	- process learning/instruction
(2) lab activities (instructor records) - descriptive - non-credit	each cluster	8	Educational Evaluator	- process learning/instruction
6. Observation - - descriptive - audio-tutorial sessions - non-credit	occasional	6	Educational Evaluator	- process learning - interaction - group activities
7. Interview - personal - descriptive - structured (questions known by interviewer) - non-credit.	end of course	1	Educational Evaluator	- values/attitudes - cognitive affective instructional environmental
8. Time Sheet* - home/audio-tutorial categories - non-credit	each cluster	continu-ous	Student	- average time per unit

B. INSTRUCTORS

1. Activity Breakdown (Logbook of Activities)* - 6 major categories specific descriptive details of total activities re course	Cluster (as they occur)	Course details	Instructor	- process activities, hours spent, modifications to existing materials student contacts, impressions, etc.
2. Instructor Course Evaluation Post-Cluster Questionnaire* - scales - multiple choice - open-ended (short) (parallel form to Student Course Evaluation Post-Cluster Questionnaire)	end of cluster	8	Instructor	- values/reactions instructional cognitive affective
3. Administrative Details* (very brief) - scales - ease of administration usability credibility transferability preference	end of cluster	8	Instructor	- values
4. Record of Student Activity* - marks, progress - pre/post test records - written/credit exams - overall participation	continuous		Instructor	- assessment (students)
5. Personal Interview - descriptive - structure (questions known by interviewer) - additional comments by instructor	end of course	1	Educational Evaluator	- values/attitudes cognitive affective instructional environmental

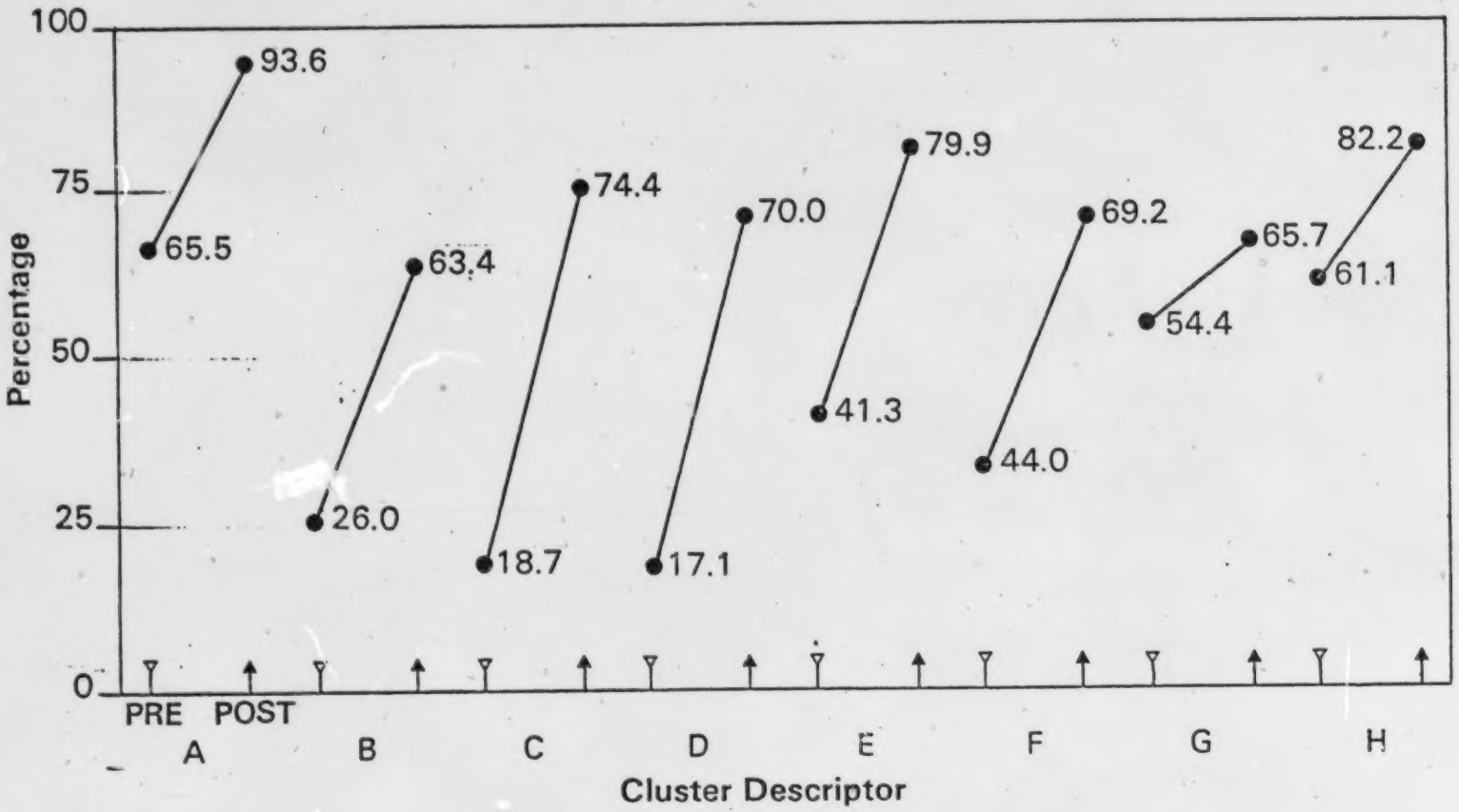
C. GENERAL

- PACKAGE/LEARNER/INSTRUCTOR INTERACTION AND INFORMATION
- based on data collected in A and B
- synthesis into category descriptors:
  - adaptability
  - usability
  - credibility
  - transferability
  - preference
  - packaged materials
  - cost/effort effectiveness
  - teaching/learning effectiveness
  - audio-tutorial qualification
    (did modifications depart from concept?)*
    See D for details of modifications
  - Athabasca course offering qualification
    (does technique suit needs of university and student body?)

D. ADDITIONS/MODIFICATIONS TO PACKAGED AUDIO-TUTORIAL MATERIALS

- Format
- Exams
- Updates
- Time Expenditures (People Resources)
  - Project Assistant*
  - Instructors* (contained in Activity Breakdown)
  - Others*

FIGURE IV-1. PRE-POST COMPARISONS - LLOYDMINSTER CENTRE (n = 8)



loading on laboratory-type activities. Cluster C (The Working Cell) gives an indication of the level of difficulty of the material in both the pre-tests and the post-tests. In addition to providing evaluative data on the methodology and learning, the pre-post tests were used by instructors and students as review materials prior to credit examinations, or as subject matter for discussion sessions.

Figure IV-1 (see page 32) provides comparisons of pre-tests and post-tests for Lloydminster Centre across clusters. Unfortunately, we were unable to collect complete data for the Fort McMurray Centre, although where data were available, the pre-post gains were significant.

2. Written Examinations

Appendix B gives a breakdown of the credit examinations results. These results indicate that all persons taking the complete set of examinations passed the course (10/15). One student withdrew after four clusters due to job transfer, and has the option to continue. Two students withdrew due to shift work and overtime demands. One of these students failed the examinations due to job demands, but continued auditing because of his general interest in the course. Two students withdrew before they took the first set of examinations.

Of the Fort McMurray students, three out of the original seven enrolments completed the course. The group mean was 89.7%. Seven of the eight original Lloydminster students completed the course. Marks in the four examinations ranged from 62 to 94, with a final group mean of 83.5%.

Four credit examinations were given during the year, each examination covering two clusters. The first two examinations counted for 1 credit each, while the last two were assigned 2 credits each. Final marks were via a weighted mean. The examinations were open-book, and approximately four hours in duration. They consisted of multiple choice questions, short answers, and short essays, the format being the same as used in the pre-test/post-test assessment. Examinations were controlled from the Athabasca University offices, with 70% AU input and 30% instructor input.

3. Student Characteristics

Appendix A summarizes information gathered from the fifteen students who originally enrolled in the course and is summarized in Appendix C.

The majority (83.3%) of the students were female.

Students lived in households containing from 0 to 12 people (other than the student), with a mode of 3. In most cases (75%) the dependents in the household were less than 18 years of age.

The majority of students came from small cities (population 10,000 - 20,000) and worked in these communities.

Sixty percent of the students had previous university, college or trade/technical education. Junior high school was the lowest level of education (16%) and university graduation the highest (8%). Education of the spouse ranged from junior high school (20%) to

university, trade/business/technical schools (70%). Education of the parents of the student ranged from elementary (37%) to college, trade, or university level (32%).

The last formal coursework was taken either 3-5 years prior to the present course (45%), or more than 5 years (46%). Less formal courses attended within the past year (evening courses, extension, training, etc.) centred on first aid or safety courses; home and family living; and technical/vocational skills.

Forty-seven percent of the students were housewives, and 33% were from the teaching or nursing professions.

Reasons given for taking a course at Athabasca were varied, but concentrated on four main issues: interest and self-improvement; transferability to other institutions; preparation for future career or change in career goals; Athabasca University degree. Reasons for studying with Athabasca University related to distance (cannot travel to institutions where courses are available); needs-availability (no other courses available locally); preference for self-pacing; and preference for home-based materials.

Most students preferred to study during the traditional September/December and January/April time periods.

4. Student Course Evaluation Post-Cluster Questionnaire

Each student completed a post-cluster questionnaire immediately after each of the eight clusters had been completed. These data were used in course revision for the 1977/78 year. The instrument was of considerable usefulness in such a task. As an illustration of the information gathered for one cluster, Cluster A - Human Sexuality, refer to Appendix D.

5. Development Scan

During each session at the learning centres, the instructor maintained an ongoing scan of the student workbooks and of the laboratory activities. During this activity, the instructor provided feedback to the student(s) and also recorded problem areas for discussion in a later summary or small group session, and/or for discussion with the AU offices in Edmonton.

6-7. Observation and Personal Interviews

During the academic year, the educational evaluator conducted approximately six personal interviews and observations of the students, instructors, and class in-process. At the end of the year, a questionnaire was distributed to each student asking for detailed evaluation of the complete course.

Appendix E is an example of the descriptive information obtained from personal interviews and observations of students, instructors and the class during Cluster F (Plant Structure and Function).

Appendix F illustrates the information obtained via the Student Post-Course Questionnaire for the Lloydminster Learning Centre. The Post-Course Questionnaire was designed as a parallel instrument to the Post-Cluster Student Questionnaire. The instruments were, however, complementary and non-redundant. That is, the Post-Cluster Questionnaire evaluated each cluster in detail, with comparative measures taken on each unit within the cluster (minicourses). The Post-Course Questionnaire evaluated the entire course, with comparative measures taken on each unit within the course (clusters).

The Post-Course Questionnaire was generally positive, suggesting minor changes in pacing, sequencing, division of learning centre/home activities, etc. The students favoured the audio-tutorial method of instruction over comparable traditional instruction. They found the content to be relevant to their academic program plans and career development, and felt the course provided them with a heightened awareness and appreciation of biology in day-to-day living.

These data yielded process measures of learning and instruction, including the interaction of students, tutors, and the audio-tutorial materials and activities. The post-course questionnaire yielded evaluative data from cognitive, affective and instructional/environmental perspectives. The post-course questionnaire was especially useful in course revisions and modifications, while the personal interviews and classroom observations were useful in documenting the type of feedback given by the instructors and the learning activities.

8. Time Expended - Students and Instructors

Since evaluation of time expended on instruction and learning assumes an interaction of student, instructor and materials, this section will combine data from both student and instructor measures.

Student Measures -

The course was modified to include a home-based section. This

was necessary since students met only once a week (full day) at the Lloydminster Learning Centre, and two evenings per week plus occasional Saturday mornings at the Fort McMurray Learning Centre. Students were given instructions to complete certain portions at home prior to a Learning Centre meeting. This included sections not completed 'in class'. Regular audio-tutorial activities took place during the scheduled learning centre sessions.

Students were asked to break down their time into learning centre and home-based activities. They categorized it by each unit of instruction (minicourses and/or clusters). Recorded hours do not include time spent on individual review or study, but do include minimal repetition of A-T materials and assignments. The figures are therefore moving towards a minimal learning time, as opposed to 'instruction' time.

Table IV-B (see page 39) gives a summary breakdown of the amount of time across clusters spent by students in the Fort McMurray and Lloydminster Learning Centres. A breakdown of this information is given in Appendix G.

Unfortunately, data from the Fort McMurray Learning Centre are incomplete, extending over six of the eight clusters. Students spent a minimum of 88.8 hours at the learning centres for these six clusters (14.8 hours per cluster) and a minimum of 77.9 hours (13.0 hours per cluster) at home. Total time spent on compulsory minimal (first exposure) learning activities for the six clusters was 166.7 hours or 27.8 hours per cluster.

TABLE IV-B. Time Expended by Students in Learning Centre and Home-Based Activities by Clusters (Hours)

Cluster	Lloydminster Learning Centre			Fort McMurray Learning Centre		
	Learning Centre	Home	TOTAL	Learning Centre	Home	TOTAL
A	13.1	15.1	28.2	8.2	11.6	19.8
B	26.1	24.9	51.0	21.8	17.5	39.3
C	13.7	18.2	31.9	16.8	13.3	30.1
D	13.4	12.6	26.0	15.0	8.5	23.5
E	12.5	14.8	27.3	12.0	9.0	21.0
F	23.8	19.6	43.4	15.8	18.0	33.0
G	17.4	14.6	32.0	-	-	-
H	2.0	10.9	12.9	-	-	-
TOTAL	122.0	130.7	252.7	88.8	77.9	166.7
Time/Cluster	15.3	16.3	31.6	14.8	13.0	27.8

Students at the Lloydminster Learning Centre spent a minimum of 122.0 hours at the Learning Centre (a mean of 15.2 hours per cluster) and a minimum of 130.7 hours in home-based study (a mean of 16.3 hours per cluster). Total time spent on compulsory minimal (first exposure) learning activities was 252.7 hours, or 31.6 hours per cluster. Figure IV-2 (page 41) illustrates the time distribution for the Lloydminster Learning Centre.

In comparing the time spent by students at the two Learning Centres in A-T learning activities for the first six clusters, we see that the Lloydminster students spent more time than the Fort McMurray students in both home-based activities (102.6 vs. 88.8 hours) and Learning Centre activities (105.2 vs. 77.9 hours).

Instructor Measures

The instructors were asked to divide their time into six categories: familiarization; instruction (laid-down A-T activities); additional instructional activities; evaluation or assessment; organization or administrative; and 'other'. Table IV-C (page 42) compares the Lloydminster and Fort McMurray Learning Centres on Clusters A and B only. The data indicate that instructors spent comparable total amounts of time on the category Instruction (28.5 vs. 27.8 hours). However, since the Fort McMurray Centre opted to utilize additional instructional activities (lectures) and less laid-down A-T materials, time was

FIGURE IV-2 Time Distribution - Students: Learning Centre and Home
(means hours per cluster, n = 8) - Lloydminster Centre

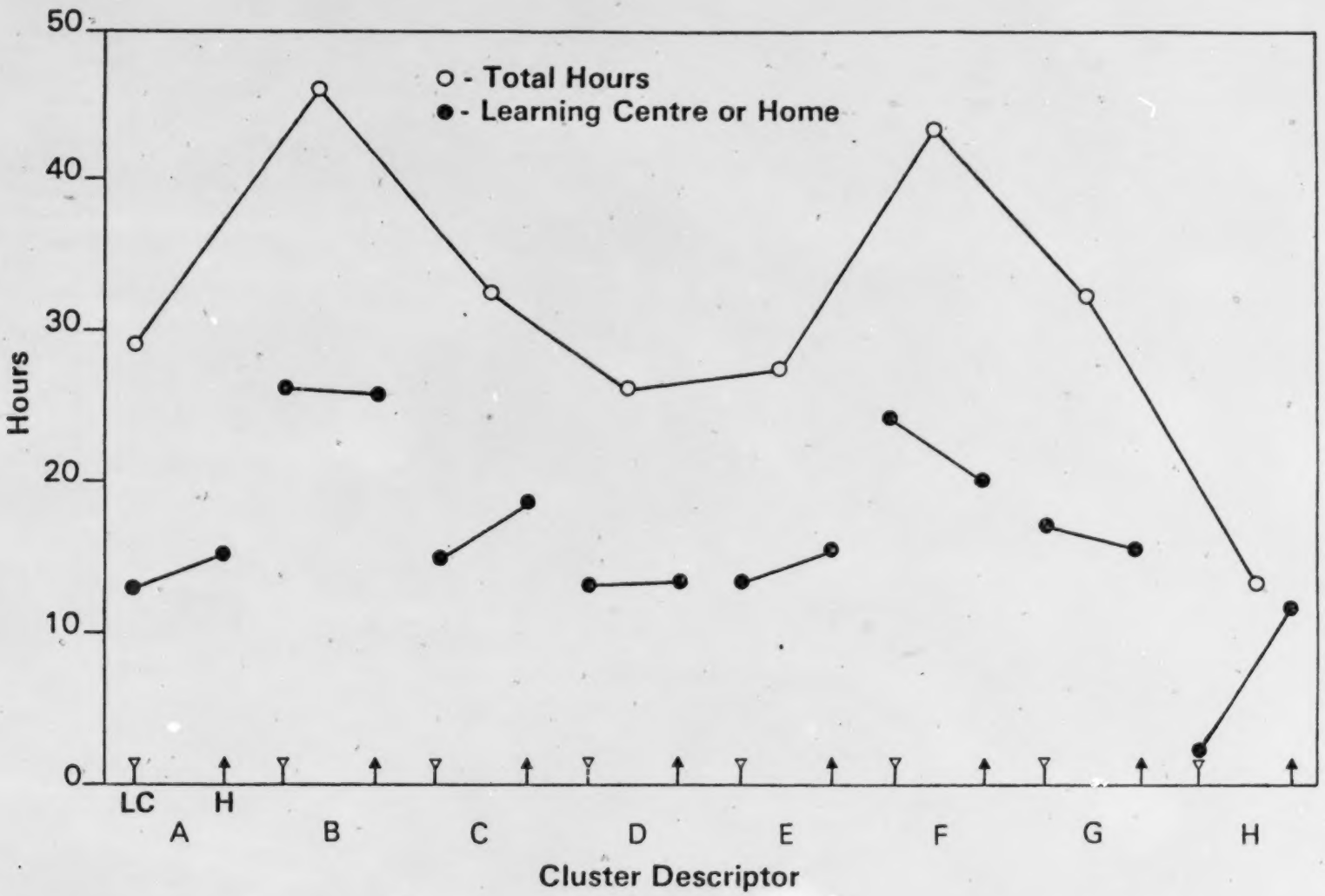


TABLE IV-C

Breakdown of instructor-time spent on Cluster A and B (hours and percentages shown) for the Lloydminster and Fort McMurray Learning Centres

Learning Centre	Familiarization		Instruction						Evaln./ Assessment		Orgnzn./ Admin.		TOTAL	
			Laid-Down A-T		Additional		Total							
	Hours	%	Hours	%	Hours	%	Hours	%	Hours	%	Hours	%	HOURS	%
Lloydminster	21.0	32.6	26.5	41.1	2.0	3.1	28.5	44.2	10.5	16.3	4.5	6.9	64.5	100
Fort McMurray	10.5	20.0	13.8	26.4	14.0	26.8	27.8	53.2	10.5	20.1	3.5	6.7	52.3	100

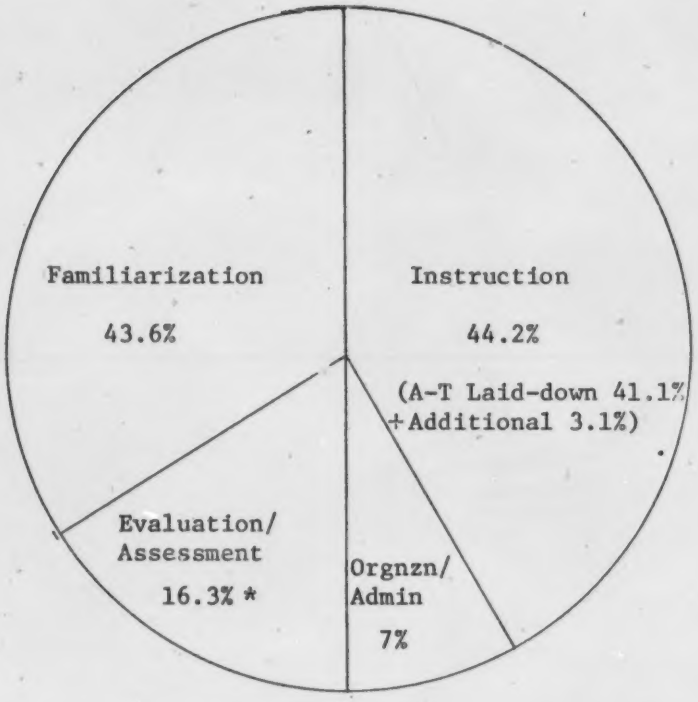
equally divided between these two sub-categories. Lloydminster followed the A-T method exactly, and therefore spent a minimal amount of time in non-laid-down activities. Taking A and B as a representative cluster pair, we see that for every hour of A-T instruction, students spent a minimal 2.5 hours in the 'learning' process. (28.5 mean instructor hours vs. 69 mean student hours.) It should also be noted that when the instructors were not involved in A-T instruction at the Learning Centre, they were free to pursue evaluation or administrative activities, yet were still available to respond to student requests.

In the category "Familiarization", the Fort McMurray instructor spent significantly less time familiarizing himself with the A-T material than did the Lloydminster instructors. Presumably he spent much of his time rewriting A-T materials into his own lectures, although no data is available on this aspect.

In the categories "Evaluation" and "Organization/Administration", no significant differences between learning centres emerged.

Since the Lloydminster Centre used a strict A-T model, it is likely that the percentages and hours shown for Clusters A and B would be reflected across the remaining clusters. Figure IV-3 (page 44) shows a predicted division on instructor-time using the A-T method for MIB.

FIGURE IV-3 Predicted allocation of instructor-time using the A-T method



* 70% - AU Designed and Marked
30% - Instructor Input and Marking

B. Instructors

The second major evaluation section concentrated on instructor measures.

1. Activity Breakdown (Logbook of Activities)

Each instructor commented in detail on the types of activities for each cluster. We had suggested six major categories under which he would describe his activities and the activity breakdown also included hours spent in modification to existing materials, etc. Because there was so much data which had accumulated on this measure, we are submitting an activity breakdown sheet for one cluster only. The cluster chosen for this measure is Cluster A (Human Sexuality). A copy of the activity breakdown sheet, for the instructors at Lloydminster and the instructor at Fort McMurray, is given in Appendix H.

Details relating to time have already been discussed above (page 40) under "Instructor Measures".

2. Instructor Course Evaluation Post-Cluster Questionnaire

One cluster has been chosen to illustrate this instrument and the type of data which is obtained from it. The cluster chosen is B (The Working Cell), and the instructors were from the Lloydminster Learning Centre. The breakdown is given in Appendix I.

Information from (1) and (2) was submitted to the Edmonton Office for incorporation in planned course revision, and as aid for new instructors.

3. Administrative Details

Administrative details, including constructive criticism, were provided to the Edmonton Office by the Learning Centre instructors using the mail, telephone, and personal visits. In turn, the Edmonton centre provided the Learning Centres with all materials required for the course, including examinations.

A wrap-up evaluative session was held during the early summer with the Lloydminster instructors and the Edmonton content and evaluation staff. At this time, a review of significant indicators for change to the course materials was conducted, covering such items as course content (length, number of clusters and objectives, assignments), sequencing, evaluation and assessment (including examinations, and ongoing evaluation). A revised course outline was then drawn up for the 1977/78 course offering. Revisions to course materials, based on the evaluative data from the 1976/77 year were carried out by a course team consisting of appropriate content, instructional design, and evaluation personnel.

4. Record of Student Activity

Each instructor monitored student activity, and provided feedback to the student at appropriate points during instruction.

Such feedback occurred as the instructor noted the student's progress in the workbook and/or during laboratory activities, summary or guest lectures, and the pre-post tests, examinations, and evaluation sessions.

5. Personal Interviews

The educational evaluator interviewed each instructor on the occasion of six visits to each Learning Centre. An example of this type of interview is given in Appendix E. Information gathered was used primarily in course revisions or modifications for the 1977/78 year.

C. General

Although a comparison of the A-T method used at the two Learning Centres with those at traditional universities is not possible due to our research design and purpose, several trends emerge from our study which should be investigated empirically in future studies.

In a traditional university, one full-year introductory 6-credit science course normally involves approximately 26 weeks of combined supervised and face-to-face instruction, totalling 156 minimal hours (78 minimal lab + 78 hours minimal lectures). Both students and instructors would be placed under this campus-based constraint. These totals do not include individual student (or instructor) time spent on preparatory or remedial help, etc. This latter time is subject to

individual variations in learning process; whereas the instructional time can be controlled, or at least recorded.

The present study indicates that students spent a minimal 122.0 hours at the Learning Centre (Lloydminster data) and a minimal 130.7 hours at home-based study. Total time spent on compulsory, first-exposure learning experiences was therefore 252.7 hours, or 31.6 hours per cluster. This figure includes the repetition of A-T materials, and assignments. It does not include reviews for examinations. Using Clusters A and B to compare instructor and learner time, we see that the student spent approximately 2.5 hours minimal learning time for every hour of instructor instructional time.

The present study has indicated that the A-T course in biology, as published by W. B. Saunders & Co., was effective and appropriate to the needs of the adult learners who took the course during the 1976/77 academic year at Athabasca University. Modifications to the published course were minor, and have been explained under the course content section of this report. Since the students selected for this evaluation had characteristics that may not be representative of a larger population, particularly in the area of educational entry level, it is recommended that continuing data be gathered on future biology students.

One of the weaknesses in the study was the minimal training and/or orientation given to instructors in the A-T method and its application to the course outline. The Lloydminster instructors reacted positively to the approach, and thus were prepared to spend additional time in

familiarization and application of the course as laid-down by Edmonton. The Fort McMurray instructor was not initially in favour of the A-T approach, since his preference for instruction was traditional (lecture plus laboratory). Data indicate that a high correlation exists between instructor and student acceptance or attitude towards method of instruction; and that in fact the negative reaction in the Fort McMurray Learning Centre resulted in the instructor further modifying the course to include larger segments of lecture instruction. It is thus recommended that potential instructors be interviewed prior to selection for the A-T method of instruction, and that appropriate training and orientation be provided.

We found that the original course materials were adaptable to inclusion of a home-based component. However, our experiences indicate that the students must be provided with a detailed schedule of activities to be completed at home, and that the instructors must set aside a portion of the Learning Centre time for review of these activities.

One of the advantages of the A-T methodology is the positive reaction and acceptance by students, and by the effectiveness of the varied learning activities as measured by formal examination outcomes. The instruction is individualized, allowing the student both to progress at his own rate and to receive immediate feedback from instructors or peers if a problem is encountered during the Learning Centre activities. The materials contain meaningful evaluation at

appropriate unit or process points. Students found the pre-post tests and summary questions particularly helpful in focussing on important issues and in reviewing for examinations. The organization of the course by instructional objectives and small units was helpful to the students. Students were actively engaged in learning, rather than being static receivers for lecture materials. The A-T method clearly facilitates a dynamic meld of theory and application.

A cautionary note should be injected on the designation of competency or achievement. Our experiences support the contention of Postlethwait relating to discrimination between A, B, and C learner. That is, in order to obtain an A designation, the student should be provided with alternatives such as an individual reading assignment, extended laboratory activity, or a research proposal. Instructors should attempt to include appropriate general session activities to complement the packaged materials (e.g. guest lectures, film strips, field trips, etc.).

Teaching/learning effectiveness of the package is dependent on the instructor-learner and the learner-learner interaction, and not the learner-material interaction alone.

The modifications to the course did not result in a departure from the basic principles of A-T instruction. Our experience confirms the findings in the literature which state that the methodology is flexible and adaptable to the needs of a diverse student and instructor body.

The educational evaluation scheme provides a comprehensive set of effectiveness measures including process and outcome, instructor, student and materials interactions, and a basis for ongoing validation of the evaluation instruments and course outline.

The educational evaluation schema and the audio-tutorial methodology can transfer to other courses within the Athabasca University curriculum and development organization. It is the intention of the project team to provide the appropriate program planning officers with a copy of the report and applications for further application at Athabasca.

D. Additions/Modifications

As indicated previously, modification of the materials for the 1976/77 year included selection of appropriate clusters from the original materials with consideration for avoidance of redundancy with other current AU course offerings, length of the course, availability of laboratory materials, etc.

Examinations were set by Athabasca University using the original examinations as a basis. Responsibility for updating materials lay with the central Edmonton office.

As with any new course, much time was spent by administrative, evaluation and instructional staff in familiarization with the methodology and laid-down materials and activities. It is expected that feedback from the content and educational evaluation of the 1976/77 course will be incorporated in the 1977/78 course, thus eliminating many of the minor content and instructional problems.

PART V

A SUMMARY OF
CONCLUSIONS AND RECOMMENDATIONS

V. A SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

A number of conclusions and recommendations have already been included in the previous pages. In this section, we will simply summarize these and add some which were noted during the course of the study but are not an integral part of the actual evaluation.

In general we found that the project was a rewarding experience for all concerned, i.e. the students, the instructors, and the Athabasca University staff. The students and instructors cooperated fully in the evaluation procedures, and judged the additional workload to be a useful contribution to understanding the effectiveness of teaching/learning in fulfilling the needs of the adult learner.

As a result of the positive trends noted from the evaluation, Athabasca University is offering the course in the Edmonton area during 1977/78. Ongoing evaluation is incorporated into the course which is expected to result in an accumulation of a more representative data base and concomitant effectiveness indicators. Appropriate recommendations for incorporating the A-T method of instruction in the development of other courses and for continuation of the evaluation schema have been submitted to the program planning officers of the University.

The following is a brief summary of our recommendations in four areas of major concern in giving this course.

A. Preparations for giving the course:

The decision to give the course by the A-T method was made by the

University only a few weeks before the start of the course. Earlier advertisements did not indicate that the course was to use the A-T mode, and the instructors who had been already hired did not know that they were to "teach" an A-T course. Although all instructors agreed to experiment with the newly approved A-T materials, the two at Lloydminster had a more positive attitude towards the A-T method than the one at Fort McMurray.

The instructors at Lloydminster went about giving the course by the A-T method with great enthusiasm. They thoroughly examined the MIB materials, reviewed the study guides and the instructor's manual, set up experiments as required in MIB, improvised with regard to laboratory materials and biological topics according to need, and encouraged their students to try the new materials enthusiastically. Their positive attitude was at once reflected in the reaction of the students. The latter thoroughly "enjoyed" the course even though it had its characteristic shortcomings. They fully cooperated in being subjected to endless questionnaires by the project staff in connection with the evaluation of the A-T materials, and they kept a record of various problems arising with regard to the course.

Although the instructor at Fort McMurray had agreed to using the A-T materials for the course, his attitude was less enthusiastic. His comments about the A-T materials to students appeared to have subdued or even killed whatever enthusiasm they had at the beginning

of the course. For instance, at the end of the first day of A-T instruction, when the students asked him what he thought of the A-T mode, he replied, "I was bored." This certainly affected the evaluation carried out by the project team.

In the light of these and other experiences, it is recommended that:

1. The decision to give this or any other course by any method be made well in advance (preferably six months ahead) of the start of the course.
2. The instructors be hired 4-6 months before the starting date of the course.
3. Both the instructors and the students be clearly informed about the nature of the A-T method that they will use in the course.
4. In selecting the instructors, one of the major criterion should be their enthusiasm for the A-T method.
5. The instructors be given thorough training and orientation at least one month (preferably two months) before the start of the course.
6. The laboratory materials be ordered for the first two clusters to be given, at least four months before the first A-T session for the expected enrolment in the couse, and the remaining materials be ordered shortly after the first A-T session for the exact number of students enroled.

7. Athabasca University provide adequate funds for its biology staff to collect suitable biological specimens representative of Alberta. (Also, this is much cheaper than buying from suppliers in Ontario or the U.S.A.)

B. Course Content

All evaluators agreed in September 1976 that the clusters and minicourses selected for Athabasca's Introductory Biology were more than sufficient to make it fully transferable to other Canadian universities. As the course progressed, it became obvious that certain minicourses and clusters were much more demanding than was evident at the beginning of the course. Also, the students experienced certain amount of difficulty in following some minicourses due to lack of adequate prerequisites. It is therefore recommended that:

1. Cluster H (Biology in the Contemporary World) be excluded from future offerings.
2. The sequencing of clusters be rearranged to suit the Athabasca University students.
3. Some cross-references be provided to the students with regard to certain topics, e.g. mitosis, meiosis, function of gonads, etc.
4. Additional material be included on the topics pointed out in Part III of this report.

5. Printing and other errors be taken care of by additional errata sheets.

6. Athabasca University's biologists collect during summers local plants and animals to serve as examples of the organisms more familiar to students.

C. Educational Evaluation

This is the first comprehensive educational evaluation of a course carried out at Athabasca University. It has yeilded valuable information about planning, delivery and evaluation of learner-convenient courses. It is therefore recommended that:

1. Such comprehensive evaluations be carried out eventually for all courses at Athabasca University.

2. Pre-tests and post-tests be used by students and instructors as review materials prior to credit examinations, or for discussion sessions.

3. Wherever possible, the A-T method of instruction be used by Athabasca University.

4. The sequencing of some clusters be changed. (See recommendation B2 above.)

5. The instructors should monitor student activity to provide feedback to students and to Athabasca staff.

6. Athabasca University continue to use the MIB materials for its Introductory Biology course.
7. The students be provided with a detailed schedule of activities to be completed at home, and instructors set aside a portion of the Learning Centre time to review these activities.
8. Alternative opportunity be provided to those students who wish to improve their grade.

D. Some disadvantages

1. An inherent disadvantage of the system already referred to in Content Evaluation (see pages 15-17) concerns the sequencing of clusters and minicourses. In the "Note to the Instructor" given in each Instructor's Manual, Postlethwait (1976) states that "flexibility is the key" to the cluster system, and that related minicourses from different clusters can be mixed to produce new combinations of clusters. This concept appears good in theory but is difficult to operate primarily because most minicourses require specific pre-requisite skills.

2. Athabasca University gave the course in labs which were borrowed or rented from other institutions for one week-day evening and/or a Saturday. This required that the experiments be set up by the instructor for each session and then put away at the end of that session. In a traditional university an A-T course can be given much more easily because experiments can be set up on, say, Monday, and then left "on" for the rest of the week for the students to use according to their convenience. Much more time is therefore needed to set up the experiments and displays at an Athabasca Learning Centre than in a traditional university lab.

3. In a traditional university set-up, students are always on campus, and go to the A-T lab in accordance with their convenience which may change from week to week. Athabasca students are not on campus so that they have to go to a "class" regularly every week. An adult learner may have responsibilities of the family, may do shift work, and may travel occasionally (or even often) in connection with his job. Therefore he cannot always go to a class regularly. Hence, enrolments can be expected to be low in Athabasca's A-T courses like MIB which are mostly lab-based.

E. Dissemination of the findings of this project

The findings of the present report are very significant in assisting educational institutions in the use of A-T methods in giving their courses. The authors therefore intend to disseminate the results of this investigation through a variety of means. This report is being filed with the Alberta Advanced Education and Manpower and the Athabasca University Library. A brief report has already been given to some of the Athabasca University staff, and a paper based on this project was presented by the authors at the Ninth International Congress for Individualized Instruction (see next page). It is now recommended that:

1. The findings be disseminated through appropriate press releases to the newspapers in Edmonton, Lloydminster, and Fort McMurray.

2. A paper be presented by the authors at an appropriate educational

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AU staff present paper at The International Congress of Individualized Instruction

Dr. Lochan Bakshi and Dr. Lily Oddie presented a joint paper at the Ninth International Congress for Individualized Instruction (I.C.I.I.) held November 6-9, 1977, at Purdue University, West Lafayette, Indiana. The paper was based on their last year's project on the assessment of an audio-tutorial course in biology given at Lloydminster and Fort McMurray. The materials used in the course were produced under the direction of Dr. S. Postlethwait of Purdue. Some of the ERGO readers may already know that Dr. Postlethwait is generally considered to be the "father" of individualized instruction in North America.

Several fruitful discussions were held by Drs. Bakshi and Oddie with a number of I.C.I.I. members (including Dr. Postlethwait, and Dr. Stan Nelson, President of I.C.I.I.) about the results of the researches conducted at Athabasca University. It appears that this is probably the first time that an individualized instructional package has been fully evaluated.

Following the I.C.I.I. meetings, Dr. Oddie participated in an audio-tutorial development workshop given by Dr. Postlethwait. The workshop involved the planning and development of various audio and video materials in education.

Dr. Bakshi took part in a workshop on gaming and simulation in individualized instruction. It was concerned with the development and use of games as educational tools.

The entire research project, including the visit to I.C.I.I. was funded by the Alberta Department of Advanced Education through its Learning Systems Branch. The project was carried out with the assistance of a number of persons in Edmonton, Lloydminster and Fort McMurray. Special thanks go the the following (listed in alphabetical order!):
A.U.'s Biology students, Mr. Harvey Beck, Dr. A. Chandrasekharam, Dr. D. G. Crawford, Mr. Robert Holmberg, Mr. Andy Klar, Mr. Bryan Lane, Mrs. Billie MacLean, Mrs. Lynn Marler, Dr. M. Massey-Hicks, Mrs. Sharon McKeen, Mrs. Doreen Palichuk, and Miss Heather Pringle.

conference (such as the American Educational Research Association or the Canadian Society for the Study of Education).

3. A paper or monograph be prepared for publication in an appropriate journal.

4. A seminar be given by the authors at Athabasca University.

PART VI

BUDGET

VI. BUDGET

This project was jointly funded by Athabasca University and Alberta Advanced Education and Manpower. The funds approved by the latter were as follows:

1.	Content Evaluation	$ 600.00	External evaluators
2.	Educational Evaluation	$6,000.00	Educational evaluator
3.	Support Staff	$1,000.00	Part-time staff
4.	Travel and Subsistence	$4,000.00	Project Director, Educational evaluator & Project Assistant
5.	Evaluation Instruments & Materials	nil	
6.	Administrative Costs	$1,800.00	Administration of Project
	T o t a l:	$13,400.00	

As suggested by the Learning Systems Branch of Alberta Advanced Education and Manpower in their letter of 14 March 1977, "a separate, complete financial report" for the above funds is being prepared for inspection by the auditor. The inspected report will be forwarded to the Learning Systems as soon as it is available. It is to be noted here that the funds allocated under all heads except "Travel and Subsistence" have been used up. A sum of approximately $1,000.00

remains unspent under "Travel and Subsistence". This is expected to be used by the authors in accordance with recommendation no. D2 in presenting a paper based on the project at an educational conference. This will be in keeping with the guidelines set and followed in presenting the paper at the Ninth International Congress for Individualized Instruction in November 1977.

VII. BIBLIOGRAPHY

Baker, M.M. 1970. Individualization of instruction for the Introductory Biology course. BioScience 20:1162-1163.

Curtis, H. 1975. Biology. Second Edition. New York: Worth Publishers, Inc.

Fisher, K.M. 1976. A-T science teaching: How effective is it? BioScience 26:691-697

Fisher, K.M., and B. MacWhinney. 1976. AV Autotutorial instruction: A review of evaluative research. AV Communication Review 24:229-261.

Hahn, T.C. 1971. Audio-tutorial instruction: A case study. BioScience 21:814-819.

Johnson, S.R., and R.B. Johnson. 1971. Developing individualized instructional material. Palo Alto, CA: Westinghouse Learning Press.

Mintzes, J.J. 1975. The A-T approach 14 years later - A review of recent research. Journal of College Science Teaching 4:247-252.

Postlethwait, S.N. 1976. Minicourses in Biology. Philadelphia, PA: W.B. Saunders Co.
This publication consists of 12 "clusters" containing 76 minicourses, written by various authors, and produced by Biological Sciences Curriculum Study under the directorship of Dr. S. N. Postlethwait. See text (Chapter II) for titles of clusters.

Russell, J. 1975. Evaluating minicourses in undergraduate biology. American Biology Teacher 37:361-364.

Schom, C.B., L. E. Haley, and O.P. Kamra. 1976. A comparison of lecture and audio-tutorial methods of teaching genetics. Halifax, N.S.: Dalhousie University. Mimeographed report.

PART VIII

APPENDICES

SUMMARY SHEET

PRE-TEST AND POST-TEST RESULTS

APPENDIX A

(PERCENTAGES)

	CLUSTER															
STUDENT #	A		B		C		D		E		F		G		H	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	84	96	36	74	27	87	27		37		57		67	87	76	87
2	60	88	34	42	23	53	13		47		47		40	53	46	
3	22	94														
4	82	87	28	72	13	66	13		47	63.3		83	77	93	76	80
5	86	96	22	68	20	93	13		57	93	53	80	70	97	80	94
6	56	96	36	80	20		17		37	83.3	47	83	53		46	
7	72	94	24	42	17	73	17		47		30	30	47	53	47	60
8	62	98	2	66	10		20		17		30	70	27	77	57	90
Sub-Total	524	749	182	444	130	372	120		289	239.6	264	346	381	460	428	411
$\bar{X}$	65.5	93.6	26	63.4	18.7	74.4	17.1		41.3	79.9	44	69.2	54.4	65.7	61.1	82.2
9	48	72	14	62	3	37			23	57	30	60				
12	52	76	26	78		47			37	47	33.3	56.7				
15	82	84	36	90	13	73			43			83.3				
Sub-Total	182	232	76	230	16	157			103	104	63.3	200				
$\bar{X}$	60.7	77.3	25.3	76.7	8	52.3			34.3	52	21.7	66.7				
GRAND TOTAL	706	981	258	674	146	529			392	343.6	327.3	546				
GRAND MEAN	64.1	89.1	25.8	67.4	16.2	66.1			39.2	68.7	40.9	68.3				

APPENDIX B

EXAMINATION RESULTS

Lloydminster Learning Centre:

Student #	1st Exam (1 credit)	2nd Exam (1 credit)	3rd Exam (2 credits)	4th Exam (2 credits)	Simple Average	Weighted Average *
1	92	83	83	92	87.5	87.5
2	83	61	70	82	74.0	74.7
4	94	85	91	91	90.3	90.5
5	94	83	94	94	91.3	92.2
6	81	75	83	89	82.0	83.3
7	75	62	74	84	73.8	75.5
8	83	67	83	85	79.5	81.0
Average $_n$ = 7	86.0	73.7	82.6	88.1	82.6	83.5

Fort McMurray Learning Centre:

Student #	1st Exam (1 credit)	2nd Exam (1 credit)	3rd Exam (2 credits)	4th Exam (2 credits)	Simple Mean	Weighted* Mean
9	90	69	65	82	76.5	75.5
12	91	75	91	93	87.5	89.0
13	77	71	60	--	51.0 (fail)	44.7 (fail)
14	39 (fail)	61 (fail)	27 (fail)	--	24.3 (fail)	24.0 (fail)
15	90	87	85	94	89.0	89.2
Average $_n$ = variable	77.4	70.6	65.6	89.7	66.8	64.5

* 1st exam = 1 x actual mark 3rd exam = 2 x actual mark
2nd exam = 1 x actual mark 4th exam = 2 x actual mark

APPENDIX C

SUMMARY SHEET

BLANK = NO REPLY
X = DROPOUT

SUPPLEMENTARY REGISTRATION FORM - MIB

	STUDENT NUMBER														
GENERAL INFORMATION	1	2	3 X	4	5	6	7	8	9	10 X	11	12	13 X	14	15
1. How many people, other than yourself, live in your household?	12	0	2	5	4	4	1	4	5	2		2	0		3
2. How many dependents are there in your household that are:															
(a) less than 18 years old?	-	0	1	4	3	3	0	1	4	-		1	0		2
(b) 18 years or older	-	0	1		-		0	0	-	-		1	0		-
3. Which of the following best describe:															
(a) the community in which you live?															
(b) the community in which you work?															
Circle one number in each of the following two columns.															
Where I live / Where I work															
farm or ranch (a) 1 (b) 1															
town (under 2,000) 2 2															
town (2,000 - 10,000) 3 3															
city (10,000 - 20,000) 4 4															
city (20,000 or over) 5 5															
(a)	4	4	3	4	4	4	1	4	4	4		4	4		4
(b)	4	4	3		4	4	4	4	-	4			4		-
Educational Background															
4. What is the highest level of education attained by you, your parents or guardians and spouse? Write the number of the most appropriate of the following descriptions in the blanks provided.															
(1) Elementary															
(2) Junior or high school															
(3) High school matriculation															
(4) High school diploma															
(5) Trade, business or technical school diploma															
(6) Some university															
(7) University graduate															
(8) Other															
	Dip														
You	RN	6	2	5	8	4	6	8	6	7		2/5	3		5
Spouse	-	-	2	7	5	5	7	7	7	4		2	-		5
Father	4	1	1	1		2	2	5		1		2	5		2
Mother	4	4	2	1		6	6	5		7		3	5		3
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

X DROPOUT
BLANK = NO REPLY

5. When did you complete your last formal course work? Write the number of the response that applies to you in the blank space at the right.

   (1) Within the past year
   (2) 1 - 2 years ago
   (3) 3 - 5 years ago
   (4) More than 5 years ago

6. From the list below, indicate those courses that you have attended within the past 12 months. Please include evening courses, extension courses, correspondence courses, or on-the-job training courses. Circle as many numbers as is appropriate.

		STUDENT NUMBER														
		1	2	X 3	4	5	6	7	8	9	X 10	11	12	X 13	14	15
										2						
		3	3	3				3			3			3		
					4	4	4		4				4			4
Adult basic education, such as reading, basic math	1															
High school level courses	2															
University credit courses	3															
Community college courses	4				4											
Technical and vocational skills, such as typing, auto mechanics	5	5		5												
Agriculture, such as farm management, ranching	6							6								
Managerial skills, such as hotel management, business administration	7															
Professional skills, such as law, teaching, medicine	8	8														
Civics and public affairs, such as consumer education, ecology, Canadian issues	9															
Religions, such as Bible study, ethics, meditation	10								10							
Safety, such as first aid, water safety	11			11					11					11		
Home and family living, such as home repairs, gardening, child care	12									12						12
Personal development, such as personality, physical fitness	13															
Hobbies and handicrafts, such as photography, weaving, music, painting	14															14
Sport and recreation, such as bridge, boating, golf	15				15					13						

- 67 -

Other, specify _____
16 Subj. # 9 - 6 wk Psych - Keyano College

Occupation

7. Which one of the following best describes your present occupation (or major occupation if there is more than one). Write the item number in the blank provided.

(1) housewife
(2) armed forces/police
(3) manager/administrator
(4) teacher/instructor/professor
(5) scientist/engineer
(6) draftsman/lab assistant/technicians
(7) electrical/metal and allied trades
(8) farming/ranching
(9) mining/oil industry
(10) heavy manufacturing

(11) retail sales/service
(12) clerical/office/secretarial
(13) unemployed
(14) full time student
(15) retired
(16) Other, specify _____

Studying with Athabasca University

8. (a) Why are you taking a course with Athabasca University?
Circle as many numbers as is appropriate.

Meet the requirements of my employer or profession 1
Interest and self improvement 2
Advancement in job 3
Preparation for future career/change of career goals 4
For credit transfer to other institutions 5
To-update and refresh subject knowledge 6
For Athabasca University degree 7
Other : specify_____ 8

(b) Which of the above features is the main reason that you are taking a course with Athabasca University? Write the item number in the blank to the right.

STUDENT NUMBER — BLANK = NO REPLY

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
			X							X			X		
									16						
				1	1	1		1	✓			1			1
		4					4			4			6		
			9												
															16
	16→Subj #15 - nursing 16 → ✓ #1 - nursing														68
	1				1								1		
	2		2	2	2	2	2	2	✓	✓		✓	2		2
	3						3								
	4		4			4			✓			✓	4		4
	5	5			5	5	5		✓				5		5
	6			6				6							
				7	7	7						✓			
	5	3	4	2	2	7	5	2	4	2		7	4		5
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
9. Why have you chosen to study with Athabasca University? Circle as many numbers as is appropriate.															
Prefer to work in own time, at own pace, in own home		1	1	1			1	1							1
No other courses available locally	2	2	2				2		✓	✓		✓	2		
Cannot travel to institutions where courses available	3	3		3	3	3	3	3	✓						3
Because of Athabasca University's open admissions policy			4			4						✓	4		
Prefer Athabasca University's educational philosophy to that of traditional institutions															
Prefer to work from prepared materials rather than attend lecture-style classes		6		6			6	6							

10. Indicate the extent to which you prefer to study during each of the following time periods. Circle one of numbers 1, 2, or 3 for each of the specified time periods.

	Preferred	NO Preference	NOT Preferred												
September - December	1	2	3	1	2	1	1	1	1	2	2	1	2	2	1		1
January - April	1	2	3	3	2		1	1	2	2	1	1	2	2	1		1
May - June	1	2	3	1	2			3	2	2	3	3	3	2	2		3
July/August	1	2	3	1	2			3	3	2	3	3	3	2	3		3

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

APPENDIX D

ATHABASCA UNIVERSITY

BIOLOGY 100

POST-CLUSTER EVALUATION QUESTIONNAIRE

CLUSTER A. HUMAN SEXUALITY

A. LEARNING MATERIALS

OBJECTIVES

Cluster Evaluation:

1. The objectives were clearly stated.
   10/10 said yes (Students 1, 2, 4, 5, 6, 7, 8, 9, 12 and 15).

2. The materials presented were related to the objectives.
   9/10 said yes (Students 1, 2, 4, 5, 6, 7, 8, 9 and 15).
   1/10 said neutral (Student 12).

3. I feel that the stated objectives for this cluster of minicourses were achieved.
   8/10 said yes (Students 1, 2, 4, 5, 6, 7, 8 and 15).
   1/10 said no (Student 9).
   1/10 said neutral (Student 12).

Specific Minicourse Evaluation:

-Of the minicourses in this cluster, which one(s) were most satisfactory in the above area (objectives)?

-Student 1: all.
-Student 2: all of them except venereal diseases.
-Student 4: pregnancy and human reproduction very well done.
-Student 5: human reproduction, pregnancy, birth control, V. D.
-Student 6: all.
-Student 8: pregnancy I. II and III.
-Student 9: venereal disease, birth control.
-Student 12: pregnancy II and III.
-Student 15: I felt they all met the objectives.

Post-Cluster Evaluation Questionnaire, Cluster A: Human Sexuality

A. 3. (continued)

-Of the minicourses in this cluster, which one(s) were unsatisfactory in the above area (objectives)?

-Student 1: none.
-Student 4: none.
-Student 5: sexual maturation was mostly concerning female. I felt there should have been more on male.
-Student 6: none.
-Student 7: none.
-Student 8: they were all satisfactory.
-Student 9: human reproductive system, sexual maturation, pregnancy I, II and III.

AUDIO

Cluster Evaluation:

4. Voice quality was clear, and well-paced.
   10/10 said yes (Students 1, 2, 4, 5, 6, 7, 8, 9, 12 and 15).

5. Speaker's mood was enthusiastic, and interested.
   8/10 said yes (Students 1, 2, 4, 5, 6, 7, 9 and 15).
   2/10 said neutral (Students 8 and 12).

6. Instructions for the exercises/activities were clear and easy to follow.
   7/10 said yes (Students 1, 2, 5, 6, 7, 8 and 15).
   2/10 said no (Students 9 and 12).
   1/10 said neutral (Student 4).

Specific Minicourse Evaluation:

-Of the minicourses in this cluster, which one(s) were most satisfactory in the above area (Audio)?

-Student 1: all.
-Student 2: all.
-Student 4: all.
-Student 5: all.
-Student 6: all good.
-Student 7: all.
-Student 8: pregnancy I, II and III.
-Student 12: pregnancy II and III.

Post-Cluster Evaluation Questionnaire, Cluster A: Human Sexuality

- 3 -

Audio (Continued)

6. Of the minicourses in this cluster, which one(s) were unsatisfactory in the above area (audio)?

-Student 1: none.
-Student 2: none.
-Student 4: sometimes wrong page numbers given and once wrong diagram (page 94, fig. 1).
-Student 6: none.
-Student 7: none.
-Student 8: none unsatisfactory.
-Student 9: on some of the tapes incorrect figure numbers and page numbers were given.
-Student 12: sexual maturation.

STUDY GUIDE AND HANDOUTS

Cluster Evaluation:

7. The written material was clearly presented.
   7/10 said yes (Students 2, 4, 5, 6, 7, 8 and 15).
   1/10 said no (Student 9).
   2/10 said neutral (neutral (Students 1 and 12).

8. The written material was brief and to the point.
   9/10 said yes (Students 1, 2, 4, 5, 6, 7, 8, 9 and 15).
   1/10 said neutral (Student 12).

9. The study guides, audio tapes, and handouts were synchronized.
   8/10 said yes (Students 1, 2, 4, 5, 6, 7, 8 and 15).
   1/10 said no (Sudent 9).
   1/10 said neutral (Student 12).

Specific Minicourse Evaluation:

Of the minicourses in this cluster, which one(s) were most satisfactory in the above area (Study Guide and Handouts)?

-Student 1: all but pregnancy.
-Student 4: pregnancy - life reproduction excellent. Would like a copy if possible.
-Student 5: all.
-Student 6: pregnancy.
-Student 7: # III.
-Student 8: pregnancy I, II and III.
-Student 12: pregnancy II and III.

Post-Cluster Evaluation Questionnaire, Cluster A: Human Sexuality

- 4 -

A. Study Guide and Handouts (Continued)

9. (Continued).

Of the minicourses in this cluster, which one(s) were unsatisfactory in the above area?

-Student 1: pregnancy - esp. on meiosis.
-Student 4: none.
-Student 6: none, would have like to see more on V. D.
-Student 7: none.
-Student 8: none.
-Student 9: information was too brief. I had great difficulty in following the audio portion and most of the diagrams.
-Student 12: sexual maturation.

VISUALS (Photos, Charts, Diagrams, Slides, etc.)

Cluster Evaluation:

10. In general, the visuals were of excellent quality (clarity).

4/10 said yes (Students 1, 7, 9 and 15).
5/10 said neutral (Students 2, 5, 6, 8 and 12).
1/10 did not answer (Student 4).

11. The visuals were smoothly presented and integrated within the sequence of the minicourses.
3/10 said yes (Students 1, 7 and 15).
5/10 said neutral (Students 2, 5, 6, 8 and 12).
1/10 did not answer (Student 4).

12. The visuals were effective in contributing to my understanding of the subject matter.
6/10 said yes (Students 1, 2, 7, 9, 12 and 15).
1/10 said no (Student 8).
2/10 said neutral (Students 5 and 6)
1/10 did not answer (Student 4).

Specific Minicourse Evaluation

Of the minicourses in this cluster, which one(s) were most satisfactory in the above area (Visuals)?

-Student 1: pregnancy - lots of interesting articles on the subject.
-Student 5: film not available on human birth or the rate. No slides.
-Student 6: life reprint.
-Student 7: #3.
-Student 8: pregnancy, life before birth.
-Student 9: birth control - Pregnancy-films would have been very helpful.

Post-Cluster Evaluation Questionnaire, Cluster A. Human Sexuality

- 5 -

A. Visuals (continued)

12. (continued)

Of the minicourses in this cluster, which one(s) were unsatisfactory in the above area?

-Student 1: pregnancy - could have had more information on meiosis.
-Student 4: none used, as were unavailable.
-Student 5: most satisfactory was fetal development (pregnancy).
-Student 6: the contraceptives shown were very minimal.
-Student 7: 1, 2, 5.
-Student 8: the rest had no visual aids.

TANGIBLES (Speciments, models, etc).

Cluster Evaluation:

13. In general, the tangibles were smoothly presented and integrated within the sequence of the minicourses.
6/10 said yes (Students 1, 5, 6, 7, 9 and 15).
3/10 said neutral (Students 4, 8 and 12).
1/10 did not answer (Student 2).

14. The tangibles were effective in contributing to my understanding of the subject matter.
6/10 said yes (Students 5, 6, 7, 9, 12 and 15).
1/10 said no (Student 8).
2/10 said neutral (Students 1 and 4).
1/10 did not answer (Student 2).

Specific Minicourse Evaluation:

-Of the minicourses in this cluster, which one(s) were most satisfactory in the above area (Tangibles)?

-Student 1: birth control models of various forms.
-Student 5: birth control.
-Student 7: 5.
-Student 9: birth control. We had very few models, specimens for other clusters.
-Student 12: pregnancy II and III.

-Of the minicourses in this cluster, which one(s) were unsatisfactory in the above area (Tangibles)?

-Student 1: some minicourses didn't require them.
-Student 5: human reproduction.
-Student 7: 1, 2, 3, 4.
-Student 12: sexual maturation.

Post-Cluster Evaluation Questionnaire, Cluster A. Human Sexuality

- 6 -

B. COGNITIVE CONCERNS

1. Rate the usefulness to you of each of the instructional components listed below. Circle one of the numbers to the right of each component.

Component

Audio-cassettes:
7/10 marked essential (Students 1, 2, 4, 5, 6, 7 and 8).
1/10 marked important (Student 15).
2/10 marked limited value (Students 9 and 12).

Study Guide/Handouts:
8/10 marked essential (Students 1, 2, 4, 5, 6, 7, 8 and 15).
2/10 marked important (Students 9 and 12).

Group Discussions/Seminars:

2/10 marked essential (Students 9 and 12).
5/10 marked important (Students 1, 2, 4, 6 and 7).
2/10 marked limited value (Students 8 and 15).
1/10 did not answer (Student 5).

Peer Discussions:
1/10 marked essential (Student 9).
6/10 marked important (Students 2, 4, 5, 6, 7 and 12).
1/10 marked limited value (Student 1).
2/10 marked not used (Students 8 and 15).

Individual Instructor-Student Discussions:
5/10 marked essential (Students 2, 4, 5, 6 and 15).
4/10 marked important (Students 1, 7, 9 and 12).
1/10 marked limited value (Student 8).

Projects, laboratory assignments:
2/10 marked essential (Students 2 and 9).
2/10 marked important (Student 1 and 6).
2/10 marked not used (Students 8 and 15).
4/10 did not answer (Students 4, 5, 7 and 12).

Post-Cluster Evaluation Questionnaire, Cluster A. Human Sexuality

- 7 -

B. Cognitive Concerns (Continued)

1. Rate the usefulness to you of each of the instructional components listed below (continued from previous page).

Guest lectures, slide demonstrations, etc.:
1/10 marked important (Student 9).
1/10 marked limited value (Student 8).
3/10 marked not used (Students 2, 6 and 15).
5/10 did not answer (Students 1, 4, 5, 7 and 12).

Summaries/Reviews (Instructor-led):
5/10 marked essential (Students 4, 5, 6, 7 and 9).
4/10 marked important (Students 1, 2, 8 and 12).
1/10 marked not used (Student 15).

2. Would you like to see more or less emphasis placed on the following components? Please circle the appropriate judgment.

Audio Cassettes:
3/10 said less (Students 9, 12 and 15).
3/10 said more (Students 6, 7 and 8).
3/10 said neutral (Students 1, 2 and 4).
1/10 said non-sufficient (Student 5).

Study Guide/Handouts:
5/10 said more (Students 6, 7, 8, 12 and 15).
4/10 said neutral (Students 1, 2, 4 and 9).
1/10 said non-sufficient (Student 5).

Group Discussions/Seminars:
7/10 said more (Students 2, 4, 7, 8, 9, 12 and 15).
2/10 said neutral (Students 1 and 6).
1/10 did not answer (Student 5).

Peer Discussions:
5/10 said more (Students 2, 4, 7, 9 and 12).
4/10 said neutral (Students 1, 6, 8 and 15).
1/10 said non-sufficient (Student 5).

Individual Instructor-Student Discussions:
4/10 said more (Students 1, 6, 7 and 8).
5/10 said neutral (Students 2, 4, 9, 12 and 15).
1/10 said non-sufficient (Student 5).

Projects, laboratory assignments:
2/10 said more (Students 6 and 8).
7/10 said neutral (Students 1, 2, 4, 7, 9, 12 and 15).
1/10 did not answer (Student 5).

Post-Cluster Evaluation Questionnaire, Cluster A. Human Sexuality

- 8 -

B. Cognitive Concerns (continued).

2. Would you like to see more or less emphasis placed on the following components? (continued from previous page).

Guest lectures, slide demonstrations, etc.:
6/10 said more (Students 1, 5, 8, 9, 12 and 15).
4/10 said neutral (Students 2, 4, 6 and 8).

Summaries/Reviews (Instructor-led):
6/10 said more (Students 6, 7, 8, 9, 12 and 15).
3/10 said neutral (Students 1, 2 and 4).
1/10 said non-sufficient (Student 5).

3. Generally, how would you describe the work load required in this cluster?
1/10 said very excessive (Student 9).
5/10 said heavy (Students 1, 4, 6, 8 and 12).
3/10 said just right (Students 2, 5 and 7).
1/10 said rather light (Student 15).

4. Were materials for this cluster available when you needed them?
3/10 said always (Students 2, 7 and 15).
7/10 said usually (Students 1, 4, 5, 6, 8, 9 and 12).

5. Did this cluster fit in with the theme of the course?
10/10 said yes (Students 1, 2, 4, 5, 6, 7, 8, 9, 12 and 15).

6. Was this information new to you?
8/10 said yes (Students 2, 4, 5, 6, 7, 8, 9 and 12).
1/10 said some (Student 1).
1/10 said no (Student 15).

7. Are there any concepts present in the minicourses which you feel you still don't understand? (Please list, referring to Objectives, Guidebook pps, etc. where possible).

-Student 1: no.
-Students 2 and 15: meiosis.
-Student 5: meiosis and mitosis - not completely, but apparently it is dealt with later.
-Student 6: will know after the exam.
-Student 9: page 10. Sperm pathway - diagram should be numbered on this page beginning with step I. Development of sperm and ovum was not clear.

Post-Cluster Evaluation Questionnaire, Cluster A. Human Sexuality

- 9 -

B. Cognitive Concerns (continued).

8. What is missing in this unit that you would like to see included?
   -Student 1: placed a question mark in this blank.
   -Student 5: more on sexual maturation of the male - physical and emotional - from onset of puberty to climacteric.
   -Student 9: more detailed information that can be studied if a person is having difficulty with a particular concept. Information that is co-ordinated with course outline.
   -Student 12: more class interaction and intermittent short tests to determine whether the information being studied is clearly understood.

9. Please rate your instructor on the following instructional behaviors:
   (a) promoted teacher-student discussion:
   7/10 said yes (Students 1, 2, 5, 6, 7, 9 and 15).
   3/10 said some (Students 4, 8 and 12).

   (b) was well-prepared for the cluster:
   10/10 said yes (Students 1, 2, 4, 5, 6, 7, 8, 9, 12 and 15).

   (c) when approached, explained the course material clearly and to the point:
   9/10 said yes (Students 1, 4, 5, 6, 7, 8, 9, 12 and 15).
   1/10 said some (Student 2).

   (d) wasted class time:
   9/10 said no (Students 1, 4, 5, 6, 7, 8, 9, 12 and 15).
   1/10 said yes (Student 2).

   (e) encouraged students to express themselves freely and openly:
   8/10 said yes (Students 1, 2, 5, 6, 7, 9, 12 and 15).
   2/10 said some (Students 4 and 8).

   (f) seemed enthusiastic:
   10/10 said yes (Students 1, 2, 4, 5, 6, 7, 8, 9, 12 and 15).

   (g) monopolized class discussions:
   10/10 said no (Students 1, 2, 4, 5, 6, 7, 8, 9, 12 and 15).

   (h) was able to accurately summarize and/or paraphrase materials:
   10/10 said yes (Students 1, 2, 4, 5, 6, 7, 8, 9, 12 and 15)

   (i) demonstrations were systematic and well-planned:
   6/10 said yes (Students 1, 5, 6, 7, 9 and 15).
   3/10 said some (Students 2, 4 and 12).
   1/10 did not answer (Student 8).

   (j) was able to introduce stimulating ideas about the subject matter:
   6/10 said yes (Students 1, 2, 6, 9, 12 and 15).
   4/10 said some (Students 4, 5, 7 and 8).

Post-Cluster Evaluation Questionnaire, Cluster A. Human Sexuality

- 10 -

C - AFFECTIVE CONCERNS

1. All things considered, this cluster was:
   7/10 said excellent (Students 1, 4, 5, 6, 7, 8 and 15).
   1/10 said good (Student 2).
   1/10 said fair (Student 12).
   1/10 said poor (Student 9).

2. Was this cluster an enjoyable experience for you?
   6/10 said always (Students 2, 4, 5, 6, 7 and 8).
   2/10 said frequently (Students 1 and 15).
   2/10 said occasionally (Students 9 and 12).

3. Did this cluster make you want to find out more about the ideas and issues involved? Give examples.

   -Student 1: yes, esp. re heredity, pregnancy, etc.
   -Student 2: yes, more about V. D.
   -Student 4: abortion issue has many facets to be explored.
   -Student 5: not really, I seemed to have just about enough time to get the required studying done and nothing else.
   -Student 6: yes, pregnancy, V. D.
   -Student 7: yes.
   -Student 8: interested me to the point that I'm looking forward to the next cluster.
   -Student 9: no - simply because of the way material was presented.
   -Student 12: why or how do HCG and estrogen perform their tasks in maintaining the endometrium condition.

4. Was the cluster challenging to you? Please explain.

   -Student 1: yes, more detailed than the previous knowledge I had.
   -Student 2: yes - new - interesting, it's things everyone should know.
   -Student 4: more of a review but with more depth in some areas, had no previous study in birth control or V. D.
   -Student 5: it was in the fact that I was anxious to go on to each minicourse because it was so interesting. Most things that I didn't understand soon cleared up when I went over it again or asked the instructor. But I was pleased to find out how much I remembered from 15 years ago. The method of explaining how the hormones in a female act is very good - I didn't understand it that well before.
   -Student 6: yes, information all interesting and worthwhile because all useable everyday.

Answers to Question 4 continued on next page.

Post-Cluster Evaluation Questionnaire, Cluster A. Human Sexuality

- 11 -

C. Affective Concerns (continued).

4. Was the cluster challenging to you? (continued).

-Student 7: not really, because most of the information was known to a certain degree.

-Student 8: yes. Although I knew a little about human sexuality there was much I didn't know. And probably lots to learn still. It's always a challenge to understand new material.

-Student 9: no - it was a frustrating experience for me. I found myself completing a cluster with little understanding of material presented. It was not until we decided to have a lecture course that I felt the enthusiasm to go to the library for extra Biology textbooks.

-Student 12: not particularly, perhaps, it was a challenge to relate your learning to your own particular physical circumstances.

5. What are your overall reactions to, or feelings about the cluster? Did you find it boring, dry, dull, exciting, relevant, useful? Describe.

-Student 1: relevant. Very useful for me as a nurse. Although a lot I had taken prior it was in more detail and interesting to see how much I could remember.

-Student 2: useful, interesting.

-Student 4: I found the cluster very exciting, interesting and useful. Perhaps I'll be able to use some of it in sex education for my children. They were quite curious to hear the tapes.

-Student 5: I found it very exciting and most useful. A lot of it I had learned before in nurses' training but since it was geared to any individual, it was most interesting and included things that I hadn't really studied before - e.g. orgasm - definition, etc.; -birth control methods - advantages, disadvantages, pregnancy rates; the epidemic proportions of V. D. now, also the 3 minor V. D.s. I like the matter-of-fact way the tapes are presented with the odd little anecdote and bit of humor - also the doctor's comments on the Human Reproduction and Sexual Maturation tapes. It seems that the person is actually speaking to you as an individual. I think it is a great course for any sexually mature person.

-Student 6: exciting, relevant.

Answers to Question 5 continued on the next page.

Post-Cluster Evaluation Questionnaire, Cluster A. Human Sexuality

- 12 -

C. Affective Concerns (continued).

5. What are your overall reactions to, or feelings about the cluster? Did you find it boring, dry, dull, exciting, relevant, useful? (continued from previous page)

-Student 7: relevant - explained everyday occurances of human sexuality in an easy-to-understand way.

-Student 8: exciting.

-Student 9: Harvey's brief explanations of some concepts were informative and useful. However I found listening to cassettes dull and I could not understand the material presented.

-Student 12: Seeing as how the cluster was on human sexuality I found it relevant and useful. Particularly the section on V. D. which was completely foreign to me before studying.

-Student 15: The material in this cluster was familiar to me, as I have studied it in more detail than presented here. I enjoyed it very much, and learned new information.

- o -

APPENDIX E

Personal Interviews and Observations of Students, Instructors and Class

CLUSTER F - Plant Structure and Function

A - Student Interviews, April 2, 1977.

#1 long course
can we cut something out?
still likes approach

#2 not enough time at home to organize
diversity and unity good clusters and are enjoyable
instructors good
pre/post test good experience and feedback

#3 overall review is very helpful - Bryan is good as an instructor
expt. should all be done at once - i.e. master demonstration
difference between instructors (Andy vs Bryan)
could do some work at home if organized
time is really an important element with adult students

#4 lots of unnecessary information, i.e. water rels. p.18 table 5
question the necessity of going through data when the answer is so obvious
better if we did microscope work entirely on the projecting microscope
demos. first in group, then individual work
Curtis text is received well by this student
i.e. include Curtis visuals as summary or 'tying together' p.440
review questions are OK
doesn't feel overtested; but test needs to be reviewed
should be marked and handed back as feedback

#5 she is a teacher and has many responsibilities outside of the course - i.e. other jobs/kids and responsibilities
very little time available at home, so course is demanding
Bryan's review excellent. "I haven't done all of the work and this was a good push in the right direction".

#6 course is getting heavier as we progress; conceptually and timewise items more of a load
reviews are high priority as a preview or review because could do some tasks at home; give review sheets; test what you teach
review after minicourse are more beneficial because it gives students immediate feedback on whether to proceed or not
find review on cluster also necessary
a lot of info can be done at home
suggest demos with master slide first; with questions asked in class then individual assignments
time and energy demands on adult student
must make it easier for adult students
very much enjoyed but too long

#7 not able to put as much time in as at beginning
not overly hard, more details than necessary
"We are familiar with many things; summary sheets in these cases is all that is needed, i.c. sexuality."
more group demos. to proceed individual assignments
more review sessions
need for a projecting micro, frustrating if don't get good specimen
would like to see what the perfect/good specimen is
really likes the idea of audio tutorial
doesn't like lectures approach

B Class Observation

In addition to questioning the instructor extensively on the evening of April 1, and interviewing students on April 2, I sat through a review session given by Andy Klar.

The discussion and lecture covered Plant Reproduction. Andy intended to cover Light in Plant Growth and Development during the balance of the day. Hormones in Plant Growth and Development was scheduled for Saturday, April 9. A review to take place possible on the evening of Friday, April 15, with the examination to take place on Saturday, April 16.

Andy uses a good questioning technique - rapid fire, well sequenced; ties questions in with previous units and with responses of students. The students seemed knowledgeable of the material and interested. Andy is well versed in the art of dragging information out of students!

He gave many examples related to the outside world, thereby tying the written/audio materials into everyday life.

In general, Andy urges the students to take risks to prevent incorrect generalizations from being made.

There were numerous plant examples (living) at each work table; and demonstrations (cutting, observations, etc.) were given to illustrate certain concepts.

This review session was received well by the students, and adequately 'tied up' the minicourse.

If the students did not fully understand, Andy asked them to ask questions of him. Good technique which allows for free exchange of terminology.

All in all a good session.

C Instructor/Interview, April 1, 1977.

matter of organizing materials every week is time consuming
if we can get into High School at night, it would help
material is elementary but it can catch you if you don't do the exercise yourself beforehand
really necessary to work through exercises by self prior to students doing it
there are errors in the workbook and these are being sent to Robert - good for tutor manual
instructors should incorporate errata sheets while doing exercises
volume is extensive and time-consuming
takes entire class time 9:00 a.m. - 4:00 p.m. with little time left for discussions
have to double up on lessons in some cases
approximately 2 lessons per day needed to meet schedule

Lakeland College emphasizes instructors can't take time off which interferes with contracted work.

the part time work in MIB and daily work is heavy, but it can be done
it is an ordinary workload, but to part time students and instructor it comes as an additional burden
first time giving a course is always difficult, second time around is better organized
students generally very good and understanding. Some are still missing classes with regularity. (Those who failed deserve to in a sense!)
timetable on when seeds must be germinated (for e.g.) is needed
master list of experimenter activities would be helpful
Robert's memos are helpful and his comments are good
master chart on preparing live materials etc.

Chandra is reviewing questions OK
The better students are asking questions about course
no questions on audiotutorial method it is working
moves too quickly from one thing to another, shifts too much (it is pitfall of all survey courses)
if students miss labs, they do not get penalized - should they?

Enrollments

3 - 8 students have kept up
4th struggling
5 and 6 borderline
1 dropped out
all will pass if they keep plugging
speed and pacing needs to be monitored as does amount of written material
discontinuity - this is a problem with pacing and objectives
Andy wants fewer concepts done more thoroughly
students should be involved more in experiments

Plant Structure - reproduction

Difficulty in getting through plants
effect of life

Time

One hour preparation per day necessary for instructors and 4 hours on Friday. One hour setting up, 1 hour before class, cleaning up ½ hour - Saturday.

same time as ordinary course would take, but takes time to get materials together
need guidance charts and figures
supports A - T method and agrees with switching to lecture
no control when students have earphones on
recommend projecting microscope for demonstrations
reliance on written materials perhaps too great?
need for class discussion not just individual study (perception checking)
course is too long; doesn't seem long, but students can't do it all in class time

Contemporary Biology needs to be shortened - possibly in combination with problem exams, and/or summary sheets, including references.

Human sexuality doesn't need to be in at all - can be dropped (some materials can be dropped - adults know it from life experiences)
if summarize, do not give A-T materials because they will try to complete all!
if drop units then go into others in depth, perhaps optional labs rather than complete sets of minicourses
however, with differences in instructions perhaps variability and outlines are O.K. as is
no real criticism or claim that more in depth approach will be better - but must make decision on length
more lab activities - not simply lab objectives and description
'hands on' do-it
follow up and feedback
review and discuss - more needed

For Edmonton Meeting - A.U. to provide a decision agenda
run the meeting - or else it will run us
home vs lab - yes some can be done at home
students outline OK as is
instructor needs comprehensive outline, current one should be changed and super 'organized'
review lessons for students or else they won't do it
no quarrel with A.T. course except for above
there are not a lot of problems compared to adv. It is a good method A.T. method allows for own speed; own speed is good if one has access to materials and facilities
but we are pacing (Saturdays only)
students can take home if they fall behind
discussions and feedback in class needed for those unable to keep up

APPENDIX F

Student

Post-Course Questionnaire - Lloydminster Learning Centre

A. Learning Materials

OBJECTIVES

1. Was the course outline completed?
   6/6 said yes (Students 1, 2, 4, 5, 6 and 7).

2. Were all units in the course adequately covered? That is, were the objectives of each cluster of minicourses reached?
   5/6 said yes (Students 1, 4, 5, 6 and 7).
   1/6 said neutral (Student 2).

3. For each of the units in the course, please ask yourself the following question: Were the objectives for this cluster reached?

   Cluster

   A. Human Sexuality:
      6/6 said yes (Students 1, 2, 4, 5, 6 and 7).

   B. The Working Cell:
      4/6 said yes (Students 1, 4, 5 and 7).
      1/6 said neutral (Student 2).
      1/6 said no (Student 6).

   C. Genetics:
      4/6 said yes (Students 1, 4, 5 and 7).
      1/6 said neutral (Student 2).
      1/6 said no (Student 6).

   D. Energy in Life:
      5/6 said yes (Students 1, 4, 5, 6 and 7).
      1/6 said neutral (Student 2).

   E. Diversity and Unity Through Time:
      5/6 said yes (Students 1, 4, 5, 6 and 7).
      1/6 said no (Student 2).

   F. Plant Structure and Function:
      5/6 said yes (Students 1, 4, 5, 6 and 7).
      1/6 said no (Student 2).

   G. Animal Structure and Function:
      5/6 said yes (Students 1, 4, 5, 6 and 7).
      1/6 said neutral (Student 2).

   H. Biology in the Contemporary World:
      6/6 said yes (Students 1, 2, 4, 5, 6 and 7).

4. Which of the eight clusters was the most meaningful to you? Why?

-Student 1: Genetics, animal structure and function, and Biology in the contemporary world. It related to my nursing knowledge.
-Student 2: Human sexuality, Genetics, Plant and Animal Structure.
-Student 4: Human sexuality seemed most pertinent and interesting.
-Student 5: Genetics. A lot of it was new to me - most interesting.
-Student 6: Cluster A, C, F, G & H - most useful and interesting.
-Student 7: Biology in the Contemporary World deals with "now" topics.

5. Which of the eight clusters was the least meaningful to you? Why?

-Student 1: Energy in Life - disliked it.
-Student 2: The Working Cell, Energy in Life.
-Student 4: Energy in Life, seemed to be the most difficult.
-Student 5: Energy in Life, some parts difficult to understand.
-Student 6: B - found it very dry and not stimulating.
-Student 7: The Working Cell was difficult to wade through and many of the ideas were not used again. Cluster E also.

INSTRUCTIONAL COMPONENTS:

In evaluating the course as a whole, how did you react to the following components? If you consistently did not use the component, please circle N/A (Not applicable).

AUDIO TAPES

6. Voice quality was clear, and well-paced.
6/6 said yes (Students 1, 2, 4, 5, 6 and 7).

7. Speakers were enthusiastic, and interested.
3/6 said yes (Students 1, 4 and 5).
3/6 said neutral (Students 2, 6 and 7).

8. Instructions for the exercises/activities were clear and easy to follow.
5/6 said yes (Students 1, 4, 5, 6 and 7).
1/6 said neutral (Student 2).

STUDY GUIDE AND HANDOUTS

9. The written material was clearly presented.
5/6 said yes (Students 2, 4, 5, 6 and 7).
1/6 said no (Student 1).

10. The written material was brief and to the point.
3/6 said yes (Students 5, 6 and 7).
2/6 said neutral (Students 2 and 4).
1/6 said no (Student 1).

STUDY GUIDE AND HANDOUTS (continued)

11. The study guides, audio tapes, and handouts were synchronized.
5/6 said yes (Students 1, 4, 5, 6 and 7).
1/6 said no (Student 2).

VISUALS (Photos, Charts, Diagrams, Slides, etc.)

12. In general, the visuals were of excellent quality (clarity).
3/6 said yes (Students 1, 4 and 7).
3/6 said neutral (Students 2, 5 and 6).

13. The visuals were smoothly presented and integrated within the sequence of the minicourses.
2/6 said yes (Students 1 and 7).
4/6 said neutral (Students 2, 4, 5 and 6).

14. The visuals were effective in contributing to understanding of the subject matter.
4/6 said yes (Students 1, 4, 6 and 7).
2/6 said neutral (STudents 2 and 5).

TANGIBLES (specimens, models, etc.)

15. In general, the tangibles were smoothly presented and integrated within the sequence of the minicourses.
4/6 said yes (Students 1, 4, 6 and 7).
2/6 said neutral (Students 2 and 7).

16. The tangibles were effective in contributing to my understanding of the subject matter.
4/6 said yes (Students 1, 4, 6 and 7).
2/6 said neutral (Students 2 and 5).

B. COGNITIVE CONCERNS

---

1. Rate the usefulness to you of each of the instructional components listed below. Circle one of the numbers to the right of each component. (Omit the components not included in the course)

Component

Audio-cassettes:
6/6 said essential (Students 1, 2, 4, 5, 6 and 7).

Study Guide/Handouts:
4/6 said essential (Students 1, 4, 5 and 7).
1/6 said important (Student 2).
1/6 said limited value (Student 6).

B. Cognitive Concerns (continued).

1. Rate the usefulness to you of each of the instructional components listed below. (continued from previous page).

Component

Group Discussions/Seminars:
2/6 said essential (Students 1 and 2).
3/6 said important (Students 4, 6 and 7).
1/6 said limited value (Student 5).

Peer Discussions:
1/6 said essential (Student 2).
4/6 said important (Students 1, 5, 6 and 7).
1/6 said limited value (Student 4).

Individual Instructor-Student Discussions:
2/6 said essential (Students 2 and 5).
4/6 said important (Students 1, 4, 6 and 7).

Projects, laboratory assignments:
1/6 said essential (Student 6).
3/6 said important (Students 1, 4 and 7).
1/6 said 2½ (Student 2).
1/6 said limited value (Student 5).

Guest lectures, slide demonstrations, etc.:
1/6 said essential (Student 1).
3/6 said important (Students 4, 6 and 7).
1/6 said limited value (Student 2).
1/6 said not used (Student 5).

Summaries/Reviews (instructor-led):
4/6 said essential (Students 2, 5, 6 and 7).
2/6 said important (Students 1 and 4).

Lectures by Instructor:
2/6 said essential (Students 2 and 6).
4/6 said important (Students 1, 4, 5 and 7).

2. Would you like to see more or less emphasis placed on the following components? Please circle the appropriate judgment.

Audio cassettes:
1/6 said more (Student 7).
5/6 said neutral (Students 1, 2, 4, 6 and 7).

Study Guide/Handouts:
1/6 said more (Student 7).
5/6 said neutral (Students 1, 2, 4, 5 and 6).

Post-Course Interview page 5

B. Cognitive Concerns (continued).

2. Would you like to see more or less emphasis placed on the following components? (continued from previous page).

Group Discussions/Seminars:
2/6 said more (Students 1 and 2).
4/6 said neutral (Students 4, 5, 6 and 7).

Peer Discussions:
1/6 said more (Student 2).
5/6 said neutral (Students 1, 4, 5, 6 and 7).

Individual Instructor-Student Discussions:
1/6 said more (Student 7).
5/6 said neutral (Students 1, 2, 4, 6 and 7).

Projects, laboratory assignments:
5/6 said neutral (Students 1, 2, 4, 6 and 7).
1/6 said less (Student 5).

Guest lectures, slide demonstrations, etc.:
1/6 said more (Student 1).
5/6 said neutral (Students 2, 4, 5, 6 and 7).

Summaries/Reviews (Instructor-led):
5/6 said more (Students 1, 2, 5, 6 and 7).
1/6 said neutral (Student 4).

Lectures - by Instructor:
2/6 said more (Students 5 and 6).
4/6 said neutral (Students 1, 2, 4 and 7).

3. Generally, how would you describe the work load required in this course?
5/6 said heavy (Students 1, 2, 4, 5 and 6).
1/6 said just right (Student 7).

4. Were the materials for this course available when you needed them?
6/6 said usually (Students 1, 2, 4, 5, 6 and 7).

5. In your opinion, did all of the clusters fit in with the theme of the course?
6/6 said yes (Students 1, 2, 4, 5, 6 and 7).

6. Which clusters least fit in with the theme?
-Student 1: Energy in Life
-Student 4: Felt all clusters suited the theme of the course.

Post-Course Interview page 6

B. Cognitive Concerns (continued).

7. Which cluster(s) most fit in with the theme?
-Student 1: Diversity and unity through time, Plant and Animal Structure.
-Student 4: Felt all clusters suited the them of the course.

8. Was the information new to you?
3/6 said yes (Students 2, 4 and 5).
3/6 said some (Students 1, 6 and 7).

9. Are there any concepts presented in the course which you feel you still don't understand?
1/6 said yes (Student 6).
3/6 said some (Students 2, 5 and 7).
1/6 said no (Student 4).

Of these, which were the least comprehensible?
-Student 5: Energy in Life.
-Student 6: Genetics.

10. What was missing in this course that you would like to see included or expanded upon?
-Student 1: expanded on:disease processes, population studies, genetic counselling.
-Student 2: human biology - defects, etc. Diseases.
-Student 4: perhaps a little on ecology - a lecture rather than something to read.
-Student 6: nothing.
-Student 7: content was OK. I would like to see more routine in the way it was run.

11. What was included that you would like to see omitted or shortened?

-Student 2: shorten plant and animal structure and function.
-Student 4: shorten time space for the entire course. Start beginning of Oct. and finish end of April.
-Student 6: nothing.
-Student 7: many of the experiments could have been dealt with by explanation only.

12. Please rate your instructor on the following instructional behaviors:

(a) promoted teacher-student discussion (Instructor 1 - Bryan):
4/6 said yes (Students 1, 2, 6 and 7).
2/6 said some (Students 4 and 5).

promoted teacher-student discussion (Instructor 2 - Andy):
4/6 said yes (Students 1, 2, 6 and 7).
2/6 said some (Students 4 and 5).

B. Cognitive Concerns (continued).

12. Please rate your instructor on the following instructional behaviors: (continued from previous page).

(b) was well-prepared for each cluster (Instructor 1 - Bryan):
5/6 said yes (Students 1, 4, 5, 6 and 7).
1/6 said some (Student 2).

was well-prepared for each cluster (Instructor 2 - Andy):
2/6 said yes (Students 5 and 6).
4/6 said some (Students 1, 2, 4 and 7).

(c) when approached, explained clearly and to the point (Instructor 1 - Bryan);
5/6 said yes (Students 1, 4, 5, 6 and 7).
1/6 said some (Student 2).

when approached, explained clearly and to the point (Instructor 2 - Andy):
4/6 said yes (Students 2, 5, 6 and 7).
2/6 said some (Students 1 and 4).

(d) wasted class time (Instructor 1 - Bryan):
5/6 said no (Students 1, 4, 5, 6 and 7).
1/6 said some (Student 2).

wasted class time (Instructor 2 - Andy):
5/6 said no (Students 1, 2, 4, 5 and 6).
1/6 said some (Student 7).

(e) encouraged students to express themselves freely and openly (Inst. 1 - Bryan):
5/6 said yes (Students 1, 4, 5, 6 and 7).
1/6 said some (Student 2).

encourage students to express themselves freely and openly (Inst. 2 - Andy):
4/6 said yes (Students 1, 2, 6 and 7).
2/6 said some (Students 4 and 5).

(f) seemed enthusiastic (Instructor 1 - Bryan);
6/6 said yes (Students 1, 2, 4, 5, 6 and 7).

seemed enthusiastic (Instructor 2 - Andy):
6/6 said yes (Students 1, 2, 4, 5, 6 and 7).

(g) monopolized class discussions (Instructor 1 - Bryan):
6/6 said no (Students 1, 2, 4, 5, 6 and 7).

monopolized class discussions (Instructor 2 - Andy):
5/6 said no (Students 1, 2, 5, 6 and 7).
1/6 said some (Student 4).

Post-Course Interview page 8

B. Cognitive Concerns (continued):

12. Please rate your instructor on the following instructional behaviors: (continued from previous page).

(h) was able to accurately summarize and/or paraphrase materials (Inst. 1 - Bryan):
6/6 said yes (Students 1, 2, 4, 5, 6 and 7).

was able to accurately summarize and/or paraphrase materials (Inst. 2 - Andy):
4/6 said yes (Students 2, 4, 5 and 6).
2/6 said some (Students 1 and 7).

(i) demonstrations were systematic and well-planned (Instructor 1 - Bryan):
4/6 said yes (Students 1, 5, 6 and 7).
2/6 said some (Students 2 and 4).

demonstrations were systematic and well-planned (Instructor 2 - Andy):
3/6 said yes (Students 1, 5 and 6).
3/6 said some (Students 2, 4 and 7).

(j) was able to introduce stimulating ideas about the subject matter (Instl -Bryan)
5/6 said yes (Students 1, 2, 4, 6 and 7).
1/6 said some (Student 5).

was able to introduce stimulating ideas about the subject matter (Inst 2-Andy):
4/6 said yes (Students 1, 2, 4 and 7).
2/6 said some (Students 5 and 6).

ASSESSMENT/EVALUATION

1. Did you feel the examinations accurately reflected the course content?
3/6 said yes (Students 1, 4 and 6).
1/6 said yes, especially the last two (Student 7).
2/6 said some (Students 2 and 5).

2. Did you feel you were being 'tested' too much (i.e. pre-post tests, review questions, examinations).
2/6 said yes (Students 2 and 4).
1/6 said some (Student 5).
3/6 said no (Student 1, 6 and 7).

3. Do you feel the assessment/evaluation procedure could be improved for this course?
2/6 said yes (Students 2 and 4).
3/6 said no (Students 1, 5 and 7).
1/6 said some (Student 6).

Post-Course Interview page 9

B. Cognitive Concerns (continued):

Assessment/Evaluation (continued):

Do you have any suggestions on how this might be accomplished? If so, please state:

-Student 2: present schedule for the year at the beinning. Most of the tapes to be done at home. Class time could be spent doing experiments, review, discussions on non-understood topics.
-Student 4: one evaluation for the whole course rather than after every 2 clusters.

C. AFFECTIVE CONCERNS

---

1. All things considered, this course was:
   3/6 said excellent (Students 1, 4 and 5).
   3/6 said good (Students 2, 6 and 7).

2. Was this course an enjoyable experience for you?
   1/6 said always (Student 6).
   4/6 said frequently (Students 1, 4, 5 and 7).
   Student 2 said material enjoyable at times; time required not enjoyable.

3. Did this course make you want to find out more about the ideas and issues involved? Give example(s).

-Student 1: yes, esp. in areas noted in 10 of Cognitive Concern area above.
-Student 2: no.
-Student 5: yes.
-Student 6: genetics, plants.
-Student 7: clusters C and H brought up some excellent ideas about which I would like to find out more.

4. Are you interested in taking an advanced level course in biology as a result of your exposure to this course?

-Student 1: yes.
-Student 2: yes, if not so heavy with repetition of common things.
-Student 4: perhaps.
-Student 6: yes.
-Student 7: no.

5. Was the course challenging to you? Explain.

-Student 1: yes. Challenged my previous knowledge.
-Student 2: yes, at times.
-Student 4: yes, many new ideas plus a lot of things were explained that I'd always taken for granted.
-Student 5: yes.
-Student 6: yes, very much new information for me.
-Student 7: yes, many new and different concepts.

6. Would you recommend this course to a colleague, friend, associate?
   4/6 said yes (Student 1, 5, 6 and 7).
   2/6 said neutral (Students 2 and 4).
   Student 2 added if not working and had no family ties.

7. What were your overall reactions to, or feelings about the course? Did you find it boring, dry, dull, irrelevant; or relevant, useful, stimulating, for example.

-Student 2: useful to an extent.
-Student 4: stimulating, but had difficulty finding enough time to spend on it.
-Student 5: stimulating and useful.
-Student 6: relevant, useful, stimulating.
-Student 7: all clusters contained some information of relevance.

ATHABASCA UNIVERSITY AND YOU

Do you wish further information about courses, program planning, etc.? If so, please give us a brief description of your needs, and we will try to answer your questions. Please make sure you have give us your correct address (over).

-Student 4:
(1) would like to continue with classes of some kind.
(2) would prefer not to have them on weekends but perhaps in the evening during the week.
(3) would like daytime classes but realize this would be almost impossible.
(4) interested in other science courses and also political science.

-Student 6:
(1) need counselling on courses.
(2) need information on degrees possible, job possibilities and courses and marks necessary.
(3) would it be necessary to spend some years at University on campus.

- 0 -

APPENDIX G

SUMMARY SHEET

TIME EXPENDED

CLUSTER A

STUDENT #	Learning Center	Home	Total
1	11	23	34
2	9	13.5	22.5
3	-	-	-
4	9	23	32
5	14	4.5	18.5
6	20	9	29.0
7	9	12	21
8	19.5	21	40.5
Sub-Total	91.5	106.0	197.5
Mean	13.1	15.1	28.2
9	9	8.75	17.75
10			
11			
12	9	17	26
13			
14			
15	6.5	9	15.5
Sub-Total	24.5	34.75	59.25
Mean	8.2	11.6	19.8
Grand Total	116	140.75	256.75
Mean	11.6	14.1	25.7

SUMMARY SHEET

TIME EXPENDED

CLUSTER B

STUDENT #	Learning Center	Home	Total
1	23	47	70
2		24	24
3	-	-	-
4	24	13	37
5	23.5	25.25	48.75
6	30	13	43
7	30	13.5	43.5
8	26	35	61
Sub-Total	156.5	170.75	327.25
Mean	26.1	24.9	46.8
9	24.5	14	38.5
10	-	-	-
11	-	-	-
12	21	15.5	36.5
13	-	-	-
14	-	-	-
15	20	23	43
Sub-Total	65.5	52.5	118.0
Mean	21.8	17.5	39.3
Grand Total	222.0	223.25	445.25
Mean	24.7	22.3	44.5

SUMMARY SHEET

TIME EXPENDED

CLUSTER C

STUDENT #	Learning Center	Home	Total
1	12.5	35	47.5
2	24	12	36
3	-	-	-
4	17	13	30
5	14.5	17.25	31.75
6	7	19	26
7	7	13	20
8	-	-	-
Sub-Total	82.0	109.25	191.25
Mean	13.7	18.2	31.9
9	21	14	35
10	-	-	-
11	-	-	-
12	17.5	9	26.5
13	-	-	-
14	-	-	-
15	12	17	29
Sub-Total	50.5	40	90.5
Mean	16.8	13.3	30.2
Grand Total	132.5	149.25	281.75
Mean	14.7	16.6	31.3

SUMMARY SHEET

TIME EXPENDED

CLUSTER D

STUDENT #	Learning Centre	Home	Total
1	4.75	12	16.75
2	14	10	24
3	-	-	-
4	17	9	26
5	15	10.5	25.5
6	10	14	24
7	13.75	7.5	21.25
8	19	25	44
Sub-Total	93.5	88	181.5
Mean	13.4	12.6	25.9
9	-	-	-
10	-	-	-
11	-	-	-
12	-	-	-
13	-	-	-
14	-	-	-
15	15	8.5	23.5
Sub-Total	15	8.5	23.5
Mean	15	8.5	23.5
Grand Total	108.5	96.5	205
Mean	13.6	12.1	25.6

SUMMARY SHEET

TIME EXPENDED

CLUSTER E

STUDENT #	Learning Center	Home	Total
1	7	15.5	22.5
2	-	-	-
3	-	-	-
4	14	12	26
5	17	9.75	26.75
6	12	22	34
7	-	-	-
8	-	-	-
Sub-Total	50	59.25	109.25
Mean	12.5	14.8	27.3
9	-	-	-
10	-	-	-
11	-	-	-
12	-	-	-
13	-	-	-
14	-	-	-
15	12	9	21
Sub-Total	12	9	21
Mean	12	9	21
Grand Total	62	68.25	130.25
Mean	12.4	13.7	26.1

SUMMARY SHEET

TIME EXPENDED

CLUSTER F

STUDENT #	Learning Center	Home	Total
1	19	28	47
2	-	-	-
3	-	-	-
4	26	15	41
5	26	10.5	36.5
6	24	25	49
7	-	-	-
8	-	-	-
Sub-Total	95	78.5	173.5
Mean	23.8	19.6	43.4
9	-	-	-
10	-	-	-
11	-	-	-
12	-	-	-
13	-	-	-
14	-	-	-
15	15	18	33
Sub-Total	15	18	33
Mean	15	18	33
Grand Total	110	96.5	206.5
Mean	22	19.3	41.3

SUMMARY SHEET

TIME EXPENDED

CLUSTER G

Student #	Learning Center	Home	Total
1	14.5	12	26.5
2	-	-	-
3	-	-	-
4	20	6	26
5	21	4	25
6	15	13	28
7	-	-	-
8	16.5	38	54.5
Sub-Total	87.0	73	160.0
Mean	17.4	14.6	32
9	-	-	-
10	-	-	-
11	-	-	-
12	-	-	-
13	-	-	-
14	-	-	-
15	-	-	-
Sub-Total	-	-	-
Mean	-	-	-

Grand Total

Mean

SUMMARY SHEET

TIME EXPENDED

CLUSTER H

STUDENT #	Learning Center	Home	Total
1	2	7.5	9.5
2	-	-	-
3	-	-	-
4	-	13	13
5	-	7	7
6	-	-	11
7	-	-	-
8	-	16	16
Sub-Total	2	43.5	56.5
Mean	2	10.9	11.3
9	-	-	-
10	-	-	-
11	-	-	-
12	-	-	-
13	-	-	-
14	-	-	-
15	-	-	-
Sub-Total	-	-	-
Mean	-	-	-

Grand Total
Mean

APPENDIX H

Instructor B. Lane

Page one

ACTIVITY BREAKDOWN SHEET - INSTRUCTOR

Instructions are contained on pages 1 and 2 of the "Memo to Instructors" dated October 12, 1976.

Key: * Activity - Refers to six possible categories (see page 1-2, above instructions)
Cluster
* Identification - A - HUMAN SEXUALITY

DATE	*ACTIVITY	*CLUSTER IDENTIFICATION	HRS. SPENT
October 8th & 11th	1 Familiarization	A1 Sexuality	5
12th & 13th	1 Familiarization	A2 Maturation	3
16th	Saturday Session with students. Approximately half of this 1st Sat. was admin. & logistics. Students also needed techniques (how to use cassettes) & procedures (how to use bks. & literature) information		9
15th	Discussions in Vermilion with Drs. Bakshi and Oddie - in preparation for the Saturday.		2
17th	Familiarization	A3 Pregnancy	1
19th	Preparation of assignments from teacher's guide on Units 1 & 2	A1 & A2	2
20th	Preparation of assignments from teacher's guide on Units 1 & 2	A1 & A2	2
22nd	Friday night scramble. Prepare boxes of cassettes, recorders, displays, pamphlets, coffee box' Library bks. Prepare my notes on meiosis and sex hormones	A3	4
23rd	Saturday Session with Students. 1 hr. discussion on 2nd minicourse, distribution on H.W. for week (Questions on pregnancy minicourse). Collected, answers on 1st minicourse, for marking. Discussion ended as a lecture on meiosis - Marked assignments during the day.	A3 Pregnancy Minicourse	9
24th	Familiarization	A4 & A5 Birth Control & V. D.	2½
28th	Collecting specimens from bus depot - unpacking, storing Like Xmas!!	Various Minicourses	1½
29th	Packing boxes ready to leave on Sat. cut and print tests (H. W. assignments) prepare notes.	Birth Control, V. D.	5½
30th	3rd Saturday with students. 1st hr. discussion based on H.W. question sheets.	Birth Control, V. D.	9

ACTIVITY BREAKDOWN SHEET - INSTRUCTOR

Instructor B. Lane

Page Two

Instructions are contained on pages 1 and 2 of the "Memo to Instructors" dated October 12, 1976.

Key: *Activity - Refers to six possible categories (See page 1-2, above instructions)
Cluster
*Identification - A - HUMAN SEXUALITY

DATE	*ACTIVITY	*CLUSTER IDENTIFICATION	HRS. SPENT
6 Nov.	Saturday with Students. discussion previous wks work & H.W. Qs	Pregnancy, V. D. & Birth Control Minicourses - mostly pregnancy tho'	1
29 Nov.	Phone Athabasca - Lochan about Bks and Robert to go over exam questions	A & B	½
4 Dec.	Saturday at Lloyd- Travel	Clusters A & B	1½
	4 students take exams	Clusters A & B	2
15 Dec.	Mark the exams - Fill in expense form!	exam on Human Sexuality & Working Cell	3

ACTIVITY BREAKDOWN SHEET - INSTRUCTOR

Instructor Beck

Page One

Instructions are contained on pages 1 and 2 of the "Memo to Instructors" dated October 12, 1976.

Key: *Activity - Refers to six possible categories (See page 1-2, above instructions)
Cluster
*Identification - A - HUMAN SEXUALITY

DATE	*ACTIVITY	*CLUSTER IDENTIFICATION	HRS. SPENT
	(Secretary's note: This instructor taught Human Sexuality interchangeable with other topics in the course.)		
Oct. 10/76	Familiarization (listening to tape) Laid down Instructor Activities Class: 7-10:30 p.m.	Human Sexuality (Human Reprod.) Human Sexuality (Human Reprod. & Sex. Matur.)	1 3½
Oct. 16/76	Familiarization (listening to tapes)	Human Sexuality - all minicourses	9¼
Oct. 19/76	Laid down Inst. Activities Class: 6:45-10:15 p.m.	Human Sexuality (Preg.)	3½
Oct. 23/76	Additional Instructional Activities Prepared lecture on menstruation Prepared lecture on oogenesis & sheets Prepared & typed questions on work covered for student review.	 Human Sex. (Sex. Mat.) Human Sex. (Sex. Mat.) Human Sex. (Human Repr.)	 1½ ½ 3
Oct. 24/76	Duplicated question sheets	Human Sex. (Human Repr.)	½
Oct. 26/76	Organization/Liaison	Human Sexuality	1
	Laid down Inst. Act. Class 7-10:15 p.m. included Lecture on menstrual cycle & hormones (1/2 -3/4 hr.) Outline of oogenesis (15 min.)	Human Sexuality (Students in different minicourses)	3¼
Oct. 30/76	Additional Instruct. Activities Cont. preparing & typing questions for review	Human Sex., Sex. Maturation	4
Nov. 1/76	Add'l Inst. Act. Duplicated questions & exams		
Nov. 2/76	Laid down Inst. Activities Class 6:45-10:00 p.m.	Human Sexuality (Students at different places in cluster)	1

ACTIVITY BREAKDOWN SHEET - INSTRUCTOR

Instructor Beck

Page Two

Instructions are contained on pages 1 and 2 of the "Memo to Instructors" dated October 12, 1976.

Key: *Activity - Refers to six possible categories (See page 1-2, above instructions)
Cluster
*Identification - A - HUMAN SEXUALITY

DATE	*ACTIVITY	*CLUSTER IDENTIFICATION	HRS. SPENT
Nov. 4/76	Tests/etc. Making post-test & pre-test	Human Sex/Cell	½
Nov. 5/76	Tests/etc. Xeroxing tests, etc.	Human Sexuality	½
Nov. 6, 7	Meetings in Lloydminster		
Nov. 8/76	Add'l Inst. Activities Types of questions on Sexuality	Human Sexuality/Pregnancy	2½
Nov. 9/76	Xeroxing questions	Human Sexuality	½
Nov. 10/76	Add'l Inst. Activities Typed our questions on birth control	Human Sex/Birth Control	2
Nov. 11/76	Xeroxed questions Prepared answer sheets	Human Sex/Birth Control Working Cell/Cells-Units of Life	3/4
Nov. 14/76	Add'l Inst. Activities Typed out questions on V.D.	Human Sex/Venereal Disease	2
Nov. 15/76	Xeroxed question sheets & prepared answer sheets, etc.	Human Sex/Venereal Disease	½
Nov. 28/76	Test/etc. Checked final in Sexuality - Cell	Human Sexuality & Working Cell all clusters	1
Dec. 10/76	Tests etc. Supervising exam	Human Sex & Working Cell	3
Dec. 12/76	Tests, etc. Marked exams	Human Sex & Working Cell	1½
Dec. 14/76	Laid-down Class - went over exams - Pretest Genetics	Human Sex/Cell/Genetics	3

APPENDIX I

ATHABASCA UNIVERSITY

BIOLOGY 100

POST-CLUSTER EVALUATION QUESTIONNAIRE

Cluster 'B' THE WORKING CELL

Instructor Bryan Lane / Andy Klar

Date 3/Dec/76

N.B. 'Nature of Enzymes' was taken by Andy Klar.

A. LEARNING MATERIALS

OBJECTIVES

Cluster Evaluation: (Circle the appropriate judgment)

1. The objectives were clearly stated.	NO	NEUTRAL	[YES]
2. The materials presented were related to the objectives.	NO	NEUTRAL	YES
3. I feel that the stated objectives for this cluster of minicourses were achieved.	NO	[NEUTRAL / YES]	

Specific Minicourse Evaluation:

- Of the minicourses in this cluster, which one(s) were most satisfactory in the above area (objectives)?

Cells
Cellular Chemistry
Genetic Material

- Of the minicourses in this cluster, which one(s) were unsatisfactory in the above area (objectives)?

Protein Synthesis
Immunity

AUDIO

Cluster Evaluation: (Circle the appropriate judgment)

4. Voice quality was clear, and well-paced	NO	NEUTRAL	[YES]
5. Speaker's mood was enthusiastic, and interested	NO	NEUTRAL	[YES]
6. Instructions for the exercises/activities were clear and easy to follow	NO	[NEUTRAL]	YES

Specific Minicourse Evaluation:

- Of the minicourses in this cluster, which one(s) were most satisfactory in the above area (Audio)?

Cells
Cellular Chemistry
Genetic Material

- Of the minicourses in this cluster, which one(s) were unsatisfactory in the above area (audio)?

STUDY GUIDE AND HANDOUTS

Cluster Evaluation: (Circle the appropriate judgment)

7. The written material was clearly presented.	NO	[NEUTRAL]	YES
8. The written material was brief and to the point.	NO	[NEUTRAL]	YES
9. The study guides, audio tapes, and handouts were synchronized.	NO	NEUTRAL	[YES]

Specific Minicourse Evaluation: (If possible, provide details)

Of the minicourses in this cluster, which one(s) were most satisfactory in the above area (Study Guide and Handouts)?

Cells, Cellular Chem, Genetic Material*

Of the minicourses in this cluster, which one(s) were unsatisfactory in the above area?

Immunity - ABO Blood Group Table layout confusing in Study Guide (p.5)

Immunity - p.12 & p.15 -confusing - easy to memorize what is said, but unclear as to what it means. (Con't on reverse of this page)

VISUALS (Photos, Charts, Diagrams, Slides, etc.)

Cluster Evaluation: (Circle the appropriate judgment)

10. In general, the visuals were of excellent quality (clarity).	NO	[NEUTRAL]	YES
11. The visuals were smoothly presented and integrated within the sequence of the minicourses.	NO	NEUTRAL	[YES]
12. The visuals were effective in contributing to my understanding of the subject matter.	NO	NEUTRAL	[YES]

Specific Minicourse Evaluation (If possible, provide details)

Of the minicourses in this cluster, which one(s) were most satisfactory in the above area(Visuals)?

Very few visuals supplied at all for this cluster.

Of the minicourses in this cluster, which one(s) were unsatisfactory in the above area? Cell - Unit of life; Protein Synthesis. Genetic Material: Immunity. Photos in the Scientific American articles photocopies never came out too well (Cells - Unit of life) We do lack loop films at the right time (human sexuality films were too late) or at all. I feel they are a useful tool. eg. There were 6 I supplied on DNA. They are useful for putting over facts, concepts and experimental procedures as well as letting students see "real" live specimens instead of textbook diagrams.

TANGIBLES (Specimens, models, etc).

Cluster Evaluation: (Circle the appropriate judgment).

13. In general, the tangibles were smoothly presented and integrated within the sequence of the minicourses — NO NEUTRAL [YES]

14. The tangibles were effective in contributing to understanding of the subject matter. — NO NEUTRAL [YES]

Specific minicourse Evaluation: (If possible, provide details)

- Of the minicourses in this cluster, which one(s) were most satisfactory in the above area (Tangibles)?

Cells - Units of Life - Microscopic specimens interesting to students, but use of microscope needs more than my ½ hr. introduction.

- Of the minicourses in this cluster, which one(s) were unsatisfactory in the above area (Tangibles)?

- Protein kit gave problems to students at home. eg.:

1) MRNA reads upside down. 2) transfer RNA reads R→L instead of L→R. 3) Ambiguity about codons for F-methionie /methionine 4) Codons wrong in photos P. 13-16. 5) Students found translation exercises tedious. (cont'd below)

INSTRUCTOR'S MANUAL

Cluster Evaluation: (Circle the appropriate judgment)

15. In general, the instructor's manual was well integrated with the student Study Guide — NO NEUTRAL [YES]

16. Rate the usefulness to you of each of the instructional components found in the Instructor's Manual. Circle one of the numbers to the right of each component. (Please note that Not Used means that you as an instructor did not use the component, while Not Included means that the component was not included in this cluster).

Component	Essential	Important	Limited Value	Not Used	Not Included
Prerequisites	1	2	3	[4]	5
Summary	1	2	[3]	4	5
Objectives	[1]	2	3	4	5
Equipment and Materials	1	[2]	3	4	[5] - some did not arrive
Instructional Considerations	1	[2]	3	4	5
Responses to Exercises	1	[2]	3	4	5
Suggested Evaluation Items	1	[2]	3	4	5

Immunity - no antigen antibody kits - had to show photos of quantitative, precipitin test.

Specific minicourse Evaluation: (If possible, provide details)

Of the minicourses in this cluster, which one(s) were most satisfactorily covered in the Instructor's Manual:?

The Cell, Cellular Chem.

-Of the minicourses in this cluster, which one(s) were least satisfactorily covered in the Instructor's Manual?

Immunity - superficial and confusing presentation in book.

INSTRUCTIONAL COMPONENTS -

1. Rate the usefulness to you as an instructor of each of the instructional components listed below. That is, how necessary were each of these components in the facilitation of learning and completion of objectives in this cluster?

Component	Essential	Important	Limited Value	Not Used
Audio.cassettes	1	2	3	4
Study Guide/Handouts	1	2	3	4
Group Discussions/Seminars	1	[2]	3	3
Peer Discussions	1	[2]	3	4
Individual Instructor-Student Discussions	1	[2]	3	4
Projects, laboratory assignments	1	[2]	3	4
Guest lectures, slide demonstrations, etc.	1	2	3	[4]
Summaries/Reviews (Instructor-led)	1	[2]	3	4
Lectures by Instructor	1	2	3	[4]
Instructor's Manual	1	[2]	3	4

2. Would you like to see more or less emphasis placed on the following components? Please circle the appropriate judgment.

Audio cassettes	LESS	NEUTRAL	[MORE]
Study Guide/Handouts	LESS	NEUTRAL	[MORE]
Group Discussions/Seminars	LESS	[NEUTRAL]	MORE
Peer Discussions	LESS	[NEUTRAL]	MORE
Individual Instructor-Student Discussions	LESS	NEUTRAL	[MORE]
Projects, laboratory assignments	LESS	[NEUTRAL]	MORE
Guest Lectures, slide demonstrations, etc.	LESS	[NEUTRAL]	MORE
Summaries/Reviews (Instructor-led)	LESS	[NEUTRAL]	MORE
Lectures - by Instructor	LESS	NEUTRAL	[MORE]

3. Generally, how would you describe the work load required of you in this cluster? (Circle your choice)

(a) very excessive
(b) heavy
[(c) just right]
(d) rather light

4. How would you describe the work load required of the student in this cluster? (Circle your choice)

(a) very excessive
[(b) heavy]
(c) just right
(d) rather light

5. Were materials for this cluster available when you needed them? (i.e. visuals, cassettes, laboratory/demonstration materials, etc.)

(a) always
[(b) usually] 50%
(c) rarely
(d) never

6. Did this cluster fit in with the theme of the course? NO NEUTRAL [YES]

7. Was this information new to your students? NO NEUTRAL [YES]

8. Are there any concepts presented in the minicourses with which the students had difficulty understanding? (Please list, referring to Objectives, Guidebook pages, etc. where possible)

Basic Chemistry lacking in some, so even though Cellular Chem. was reasonable minicourse, many found it difficult, eg., needed valency of C.H.O.N. explained, structural formulae had to be explained.

9. What is missing in this cluster that you would like to see included?

Summary - overview of Protein synthesis and Genetic material, pulling all loose ends together. Students had difficulty writing 'Essay' type answer on these minicourses. They could answer each objective, but not link objectives together in coherent sentences.

10. What additional activities were perceived as needed and were implemented by you as an instructor (not those requested by students). Examples of additional activities would be: Guest speakers, summary or review sessions, "mini" examinations, etc.

(SEE BELOW)

11. What additional activities were initiated by the students?

NONE

111

(1)
10. H.W. questions on each minicourse essential because students do not always test themselves doing exercise in Study Guide. Answers usually come on tape later anyway.

(2)
Loop films brought in by me on * below- very useful.

(3)
Discussions - group & individual - very important.

12. Please rate your class of students on the following learning behaviors:

(a) entered into teacher-student discussions	[YES]	SOME	NO
(b) were well-prepared for the cluster (readings done, etc.)	YES	[SOME]	NO
(c) when approached, appeared to understand the material in the cluster	YES	[SOME]	NO
(d) wasted class time	YES	SOME	[NO]
(e) expressed themselves freely and openly	[YES]	SOME	NO
(f) seemed enthusiastic	[YES]	SOME	NO
(g) initiated or asked for group discussions	[YES	SOME]	NO
(h) were able to synthesize materials (accurate summarizations, paraphrases, etc)	YES	[SOME]	NO
(i) demonstrations were well received	YES	[SOME]	NO
(j) laboratory exercises were completed	YES	[SOME]	NO
(k) as an instructor, I was able to introduce stimulating ideas about the subject matter	YES	[SOME]	NO

C - AFFECTIVE CONCERNS

1. All things considered, this cluster was:

a) excellent
b) good
[c) fair]
d) poor

2. Was this cluster an enjoyable experience for you?

a) always
[b) frequently]
c) occasionally
d) never

3. Did this cluster motivate you to present the ideas and issues in novel, innovative ways? If so, please describe.

YES

4. As an instructor, was the cluster challenging to you? Please explain.

YES - trying to understand the Immunity Minicourse

5. What are your overall reactions to, or feelings about the cluster? Did you find it boring, dry, dull, exciting, relevant, useful? Describe.

There are basic concepts and facts which a beginning biologist should know. eg. cell structure, chemistry, properties of enzymes, protein synthesis (enzymes) DNA structure.

I question the value of the immunity section.
a) It is confusing as presented.
b) Requires a knowledge of animal structure, e.g. blood structure - types of leukocytes, lymph node structure.